ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 27. No. 24. WEEKLY. NEW YORK, WEDNESDAY, DECEMBER 11, 1895. $3 per Annum. Single Copies, 10 Cents.

Copyright, 1895, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

A German contractor has recently received a concession to build electric railways in the suburbs of Teheran, Persia.

Dr. M. G. Jenison, of Minneapolis, recently reported that electricity has been successfully employed by him in checking hemorrhage from the extraction of teeth. The current caused instant coagulation of the blood and gave relief where the usual remedies were without effect.

Transparencies illuminated with varicolored incandescent lamps have recently been observed on New York streets. Current is supplied from storage batteries carried by the man who wields the transparency.

Brazilian advices say that the cable steamer "Faraday" will shortly leave England with the cable which is to be laid in the Amazon River from Para to Manáos. This enterprise is being carried out by an English company under contract with the Brazilian Government. The line will be 1,400 miles long, and will have 16 intermediate stations.

Superintendent Fowden has purchased for the electric light and power company, of Atlantic City, N. J., the two huge masts of the schooner "Metcalf" that went to pieces on the beach near the Iron Pier recently. The masts will be erected where they are now lying, at the corner of Pacific and Kentucky avenues, to support the company's wires. It is thought they will be of sufficient height to permit the moving of ordinary sized buildings on the avenues without having to cut the wires, as has been done heretofore.

The peat bogs of Great Britain and Ireland are estimated to be the heat equivalent of nearly 4,000,000,000 tons of coal. Electric transmission of power now renders it possible to burn peat on the bog and wire the power where needed.

A novel question has arisen between the Western Union Telegraph Company and the Commercial Cable Building Company. It relates to the ownership of five and one-half inches of property on Broad street, New York city, which is occupied by part of the Western Union Building. The encroachment extends for a distance of 90 feet, which equals about 40 square feet. The ground is valued by the Cable company at $500 a square foot, which will make this small space of ground worth $20,000. The Cable company has had plans filed for an 18-story building, with two domes three stories high. The attorneys for the companies have had several meetings, and the matter will doubtless be amicably adjusted.

Secretary Rankine, of the Niagara Falls Power Company, recently stated that proposals have been invited for the enlargement of the wheel pit to accommodate three more turbines to work in conjunction with three new dynamos capable of producing 5,000 horse-power each. The work is to be completed within six months.

Mr. Camillo Olivetti, a manufacturer of electrical instruments at Ivrea, Italy, is visiting the United States with a view to establishing agencies and to purchase machinery.

Electric Carriages in Cleveland.

A firm of real estate men propose to boom a suburb of Cleveland, O., by running a line of electric carriages between the city and the suburb.

A GIANT ELECTRIC CRANE.

DESCRIPTION OF A HIGH-SPEED ELECTRIC HOISTING AND CONVEYING MACHINE USED IN SHIP-BUILDING.

Electric cranes, while a comparatively recent development in the application of electric power, are by no means so new as to be a distinct novelty. It happens, though, that the one illustrated herewith possesses many unusual features, chief among which are its size, capacity and the speed at which it travels. The immensity of this great hoisting and conveying machine may be appreciated by a glance at Fig. 1, which gives a ready comparison between the crane and the men standing beside it.

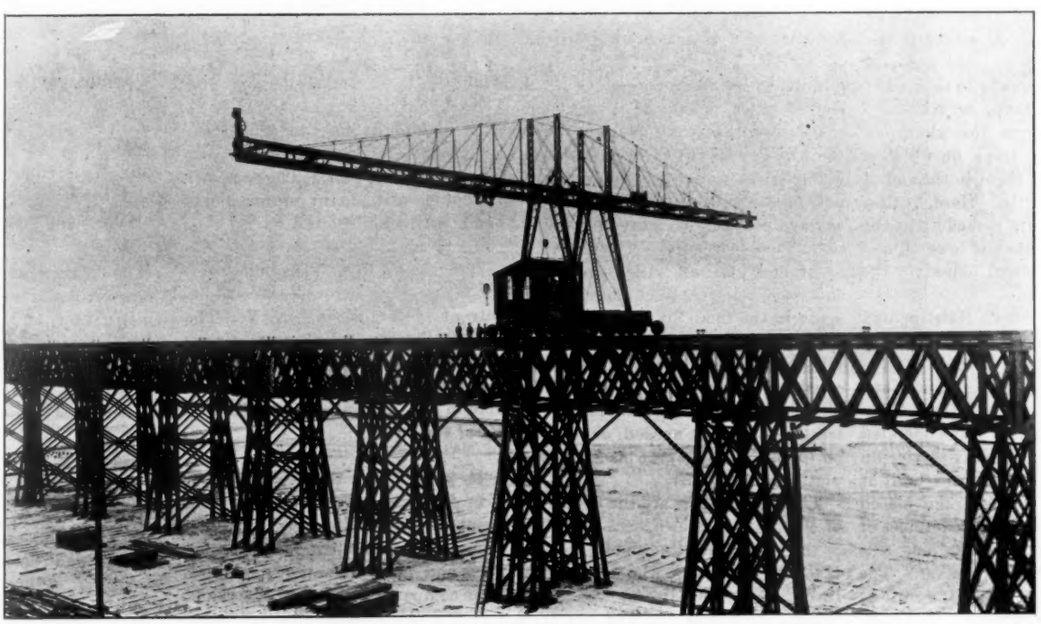


FIG. 1.—BROWN BALANCED CANTILEVER ELECTRIC SHIP-BUILDING CRANE, AT NEWPORT NEWS, VA.

Cranes designed on the cantilever principle are now in general service for moving large masses or great quantities of materials with economy and dispatch. Some of the engineering problems encountered in their construction are of the most intricate character, and when these have been successfully solved, the machine seems to be endowed with a human brain, so intelligently does it perform its allotted task. The Brown Hoisting and Conveying Machine Company, of Cleveland, O., has built a large number of such machines and is the best known and best equipped company in this country to undertake their construction. So it was that they came to build the

giant electric crane described below. In Fig. 1 is shown the Brown balanced cantilever electric shipbuilding crane now in operation at the plant of the Newport News Shipbuilding and Dry Dock Company, Newport News, Va. The illustration shows the crane at rest on the runway, which runs between two ships in course of construction. Fig. 2, on page 331, shows the electrical and mechanical operating machinery contained in the cab of the crane. The trestle and crane bring the horizontal boom of the crane high enough above the shipways to pass over the highest point of the ships during construction. The arms of the cantilever project entirely over the full width of the ships on either side of the trestle. By means of a trolley and hoist block, mounted on the cantilever of the crane, the load can be hoisted from the ground and traversed from one end of the cantilever to the other, as the pier or base of the crane is arranged so that the load passes through it. As the crane travels up and down the trestle on which it is mounted, under its own power, the entire length and width of both ships are covered by the extent of the motions of the crane, and materials can be handled and delivered from the mill to any part of the ships being built.

There is also a yard crane of the same construction which takes material from the tracks running through the yards. It either places the plates in crates or racks built for them in the yard, ready to be used at any time in the shop, or takes the finished plates from the shops on either side of the track on which it runs, and delivers them to the end of the ship crane trestle. Here, as they are needed, they are picked up by the cantilever ship crane and lowered and held in position until bolted to the frames of the ship.

Originally the Brown Hoisting and Conveying Machine Company, who are the sole builders of this type of crane, erected for the Newport News Ship Building and Dry Dock Company an experimental crane operated by steam, which saw daily service on the first two 5,000-ton ships built at Newport News. This crane placed in four and one-half hours 750 feet of plate girders on the ways, and this was considered a record breaker. The speed of this crane along the runway was 200 feet per minute. The company's idea of speeds and capacities increased in proportion to the increased output of the work of the first cantilever crane over the old methods. They wanted a new crane with an average traveling speed along the 750-foot trestle on which it was to run of 600 feet per minute, with its full load of 12½ tons, 55 feet out on the cantilever of the crane, or with 9,000 to 10,000 pounds at the extreme end of the cantilever, which was to be 90 feet each side of the center. The distance from the ground to the cantilever of the crane was to be an average of 97 feet. Complying with these requirements, a new crane was built. All the speeds of hoisting and lowering, it can be seen, must necessarily be very rapid to allow the crane to handle material for two ships under construction at the same time, and to be economical by not keeping the men waiting for material. It was decided to use electric power for the new crane.

The difficult problem in this connection was to get a motor of sufficient power, and at the same time of such construction, that it would handle the widely varying loads that were required to be handled and at varying speeds in proportion to these loads. It was decided that a single motor of large size must be used. On account of the heavy changes of current and the sudden variation of load, it was considered impracticable to use a reversing motor; therefore, friction clutches were determined upon to control all the motions of the machinery. The motor used developed at 110 revolutions 20 to 25 horse-power; at 387 revolutions 75 to 80 horse-power with 360 amperes of current and 220 volts. In a test, the crane started from rest with 460 to 480 amperes of current, and as soon as it got under headway, it ran down to 280 amperes; with the crane running light over the course, it averaged 612 feet per minute, and over the center 300 feet it averaged 692 feet per minute, with about 300 amperes of current. With 10,000 pounds load at the end of the cantilever, the average speed over the course was 626 feet per minute, and over the center 300 feet was 750 feet per minute with 280 amperes. With a load of 28,000 pounds at 55 feet from the center, the crane averaged over the whole course 610 feet per minute and over the center 300 feet, 680 feet per minute with 280 amperes. The average voltage was 220. The speed of 750 feet per minute means about eight and one-half miles per hour, this speed being obtained and absorbed again in the small limit of 564 feet. Only one man is required to operate all the motions of the crane, but an assistant travels with it to handle and guide the plates on either side of the trestle as they are needed, or to hook on the plates as they are placed on the platform of the pier.

These cantilevers are the invention of Mr. Alex. E. Brown, vice-president of the Brown Hoisting and Conveying Machine Company, who is also the inventor of the Brown cantilever machines on the Chicago drainage canal, and the Brown coal and ore handling machinery in use on the Great Lakes.

National Carbon Company Sued.

Infringement of patent is charged against the National Carbon Company and Webb C. Hayes in a bill recently filed in the United States Circuit Court at Cleveland. The charge is made by Charles O. Bartlett, who says that he is the patentee of certain improvements on a carbon-trimming machine, which is being used at the National Carbon Works. A perpetual injunction is asked for, as well as an accounting for damages.

TELEPHONE NEWS AND COMMENT.

An opposition telephone exchange is reported to have secured nearly 50 prospective subscribers at Gettysburg, Pa. One hundred subscribers are wanted to insure the building of an exchange.

General Manager Durant, of the Bell Telephone Company, of Missouri, is a strong advocate of the underground conduit system which the daily papers of St. Louis are urging for that city.

The Commercial Cable Company has declared a quarterly dividend of one and three-quarter per cent, payable January 2 to stockholders of record December 21. Books close December 20 and reopen January 3.

The Central Union Telephone Company's business in Des Moines, Ia., has grown to such an extent as to need larger exchange accommodations. It is rumored that the company may erect a building of its own in Des Moines.

The New England Telephone and Telegraph Company's exchange at Northampton, Mass., was improved and enlarged last week. This office now has 225 telephone connections with a steady increase averaging about two a week.

The Southern Bell Telephone and Telegraph Company has reduced its rates in Mobile, Ala., to $20 a year for business stations and $12 a year for residence stations. The company also contemplates many improvements in the service at Mobile.

The Hudson River Telephone Company will offer reduced rates to its patrons in Middletown, N. Y. The Orange County Telephone Company is attempting to do business in the town and will not, it is thought, be able to meet the rates of the Hudson River company.

It is said that the New York & New Jersey Telephone Company has spent an unusually large amount of money during the past year in extensions and improvements of its service. The company now has about 12,000 subscribers and the number is increasing rapidly.

The city authorities of Chattanooga, Tenn., will probably test the validity of so much of the state revenue act of 1895 as purports to exempt news companies, express, railroad, sleeping-car, telegraph and telephone companies and building and loan associations from municipal privilege taxes.

The Central District and Printing Telegraph Company have about completed their line from Pittsburgh to Morgantown, W. Va., and connected it with all other important towns of Western Pennsylvania. Besides these the town is connected with all the villages of the county and with Fairmont, Grafton, Clarksburg and Warrington.

The telephone system of New York city is the finest in the world. The local public are finally appreciating this, and the increase in the number of patrons must be gratifying to President Cutler and General Manager Bethell, whose progressive management has brought about the very noticeable service improvement. There are some 13,000 telephone subscribers in New York city.

The City Council of Bedford City, Va., has granted a franchise for a new telephone system to C. L. Mosby, cashier of the First National Bank. His plan is said to be to secure 50 subscribers in Bedford City to buy the telephones outright at a cost of $45, the entire line to belong to the subscribers without further cost, save the expense of running the plant. The company building the line will derive its profit from the sale of the telephones. Mr. Mosby must be a philanthropist in disguise.

The American Telephone and Telegraph Company has issued a new edition of its National Telephone Directory which is a marvel of completeness. It contains the name, address and call number of every telephone subscriber in the United States who can be reached by long-distance telephone, as well as a list of public pay stations throughout the country. The long-distance system now includes the territory bounded by Merrill, Wis., on the west; Waterville, Me., on the east; St. Albans, Vt., on the north, and Pulaski, Tenn., on the south.

The American Bell Telephone Company and its licensees spent in construction and reconstruction of lines and exchanges throughout the country from 1885 to 1893 some $42,000,000, distributed as follows:

Overhead and Exchanges	$12,000,000
Subway and Cables	14,500,000
Buildings	6,000,000
Outlines	9,000,000
Total	$41,500,000

In addition to above there was half a million expended in the extension and betterment of plants generally. Previous to 1885 there had been spent by the American Bell Telephone Company and its licensees the round sum of $31,000,000, making a total cash expenditure in the telephone business of this country by the above interests of $73,000,000.

The Metropolitan Traction Company.

The Metropolitan Traction Company operates cable, electric and horse-car lines over 163½ miles of the streets of New York city, and all below the Harlem River. This is probably the most valuable street railway property in the world, and the charters under which its various divisions are operated are practically perpetual.

THE STANDARD TELEPHONE COMPANY.

SOME OF ITS SUB-COMPANIES ARE DISTURBED AT THE "ELECTRICAL REVIEW'S" EXPOSITION OF THE PARENT COMPANY.—AN INVESTIGATION ALREADY ON FOOT.—THE END IS CLOSE AT HAND.

The analysis of the affairs of the Standard Telephone Company which appeared in the ELECTRICAL REVIEW for November 20 and 27 has caused something of a sensation in telephone circles. It has also disturbed several of the Standard licensee companies and at least one investigation of the parent company's affairs is now under way. The people who paid good money for stock and a director's position want to know what became of their dollars and what they are going to get for them.

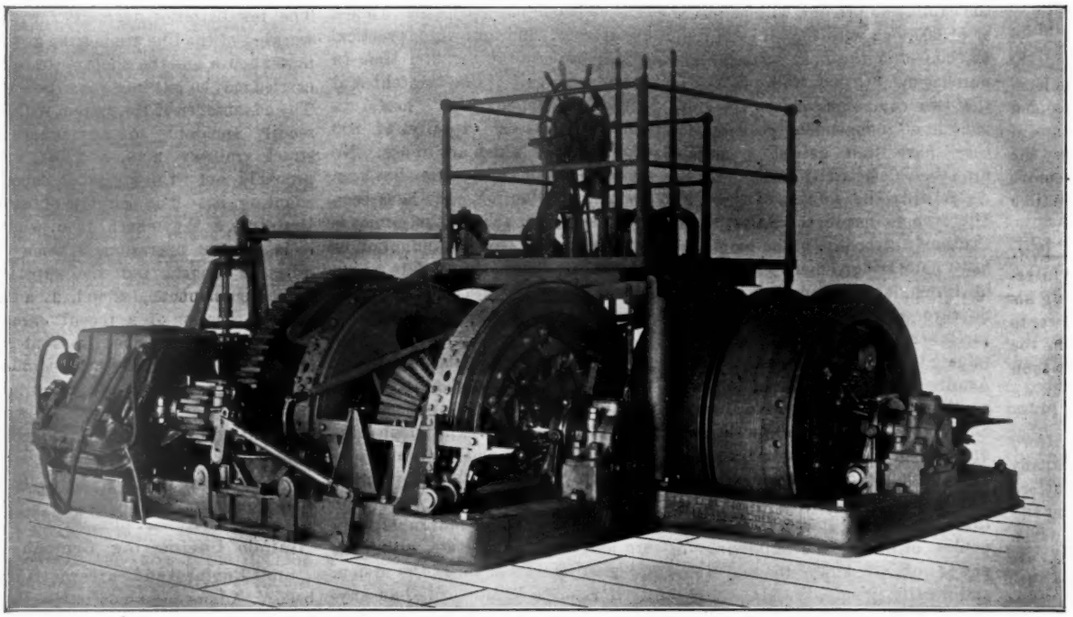


FIG. 2.—ELECTRIC POWER OPERATING MACHINERY CONTAINED IN THE CAB OF BROWN ELECTRIC CRANE, AT NEWPORT NEWS, VA.

As published in the ELECTRICAL REVIEW recently, the Wisconsin stockholders of a sub-company have begun inquiries in this direction. Still more recently the directors of the New Jersey Standard Telephone Company resolved to find out, if they could, something about the fulfillment of the promises and prospects set out so glowingly before them by General Clarkson and General Manager Allen T. Nye, of the parent company, who are credited with promoting the New Jersey company.

This company has its general office in Newark, and its "territory" is New Jersey and Delaware. There are 20 men on its board of directors, several of whom are well known. Among these is Mr. Leon Abbett, of Hoboken, N. J. He is a lawyer and a son of the late Governor Abbett, of New Jersey. He was approached by a representative of the ELECTRICAL REVIEW for an expression of opinion on Standard telephone matters.

"I have no opinion to express," said Mr. Abbett. "I have read what your paper has published about the parent company, but I have not had time to make a full investigation. At a recent meeting of our board of directors, Judge Garretson, of Jersey City, was appointed a committee of one to make a thorough investigation of the parent company and to render a report to our directors."

In further conversation Mr. Abbett led the reporter to infer that a large inducement held out to the stockholders of the New Jersey company by the promoters was the establishment of an inter-State long-distance telephone system by the Standard company. He said he did not believe a company organized simply to do a local business in New Jersey could be made a profitable enterprise. Mr. Abbett declined to state the terms on which he had acquired his stock.

Judge Abraham Q. Garretson is a lawyer in Jersey City. When asked by a representative of the ELECTRICAL REVIEW what he had learned about the Standard Telephone Company, Judge Garretson replied:

"I can say that we have decided to make inquiries about the Standard Telephone Company, but as yet I do not feel that my conclusions are sufficient to warrant any expression of opinion. We shall await developments a little longer."

This was certainly not an encouraging reply regarding a company which is credited with having secured at least $300,000 in cash for stock in a few cast-off patents. While Judge Garretson is making inquiries, it may be well for him to ask what has become of the cash which is said to have been received by the Standard Telephone Company. A manufacturer of telephones in New York city who sold the Standard company $2,500 worth of goods received several checks in payment, all of which were drawn on the personal account of Allen T. Nye (the general manager of the Standard) in the Hamilton National Bank, of Harlem. Although this manufacturer had to attach the company's office furniture to collect a part of his account, he says he never received a single company check, all his bills having been met with Allen T. Nye's personal checks.

An examination of the several patents claimed to be owned by the Standard Telephone Company will quickly convince any telephone man that they are absolutely worthless as far as their practical utility is concerned. They are sufficiently technical, however, to hypnotize even President Thurlow Weed Barnes, the self-confessed countryman.

The profound sympathy of the ELECTRICAL REVIEW is extended to the citizens of Richmond, Va., whose Board of Aldermen, at a special meeting on the night of December 3, granted a local franchise to the Standard Telephone Company. The aldermen at the same time refused to grant a franchise of any kind to the Home Telephone Company, whose directors we are informed, are among the most reputable of Richmond's people. With the record of the Standard Telephone Company before them, how the aldermen of Richmond could have granted the franchise is something mysterious. The aldermen who voted in favor of it were Messrs. Allen, Bahen, Burton, King, Mann, Moore, Noble, Reeve, Snead, Starke, Tanner, Vaughan, and President Turpin.

We wonder if they have ever seen the "wicked circular" sent out from the office of the Standard Telephone Company. In that circular "the boys who are in the pot" were shown how they would have "$20 in cash net profit on each 'phone to play with and a stock interest in every telephone of $34 to grease common councils, etc."

Mr. H. M. Smith appeared before the aldermen to advocate the case of the Home company, while Captain A. B. Guigon represented the Standard company. A part of the discussion is thus reported by the Richmond *Times* of December 4:

Mr. Guigon had said that the ELECTRICAL REVIEW, the most reliable electrical journal in the United States, had commended the enterprise of the Standard company. "I hold in my hand," said Mr. Smith, "a copy of that same journal which characterizes the Standard company as a fraud. Here it is. You can read it when you like. Mr. Guigon admitted that they got their stock cheap. Yes, they got their stock cheap. It would be cheap at any price."

Mr. Smith then read an extract from the ELECTRICAL REVIEW, in which that paper said, among other things, that the Standard should make good some of its promises or retire from the field; that some of its proceedings had been questionable, and that there were a number of questions in connection with the company which ought to be answered.

If Captain Guigon has been correctly reported, he made a totally false statement when he said that the ELECTRICAL REVIEW had commended the enterprise of the Standard company. Nothing that we have ever said could be so construed.

In spite of vigorous protests the franchise was granted by a vote of 13 to 4. And now all that the people of Richmond have to do to get a Standard telephone system is to—simply wait.

Mr. Barnes's game is about played out. The Standard company has been so well exposed to public view and its weakness has been so thoroughly proved by President Barnes himself, that when the men who have invested in its stock, and that of its licensees, finally learn how they have been duped, there won't be enough of it left to merit further notice. But far from pleasant recollections will remain in the minds of those who invested $1,000 for $100,000 worth of stock in the Standard Telephone Company. The latest indication of the value of this stock is shown by the attempt of one of the owners to borrow $250 on his entire holding (one thousand shares, par value of $100,000). The gentleman of whom the loan was requested, after investigation, emphatically declined to grant it on such security.

Mr. Harry E. Dey will deliver a lecture on "Hydraulic Gearing Applied to Electric Motors" before the Brooklyn, N. Y., Electrical Society on December 17.

OUR CANADIAN LETTER.

ARTHUR, ONT.—The Council is prepared to grant a franchise for lighting the streets by electricity. For particulars address J. M. Roach.

LEVIS, QUE.—The Board of Trade have under consideration the question of the proposed new system of electric lighting to cost $65 to $70 per arc light.

CHATHAM, ONT.—The Chatham Gas and Electric Company propose putting in new machines and engines and remodeling their plant in the Spring.

ROSSLAND, B. C.—Rossland Electric Light and Power Company, incorporated; capital, $20,000. T. W. Stack and Angus J. McDonald are among the promoters.

AYLMER, QUE.—R. H. and W. Conroy have made a proposition to light the town by electricity, and a by-law will shortly be submitted to the rate payers on the question.

TORONTO, ONT. — The Toronto Electric Light Company is about to erect a new arc lighting station to cost about $20,000. The building will be constructed of brick and iron.

NIAGARA FALLS, ONT.—The local electric light company have decided to construct a dam here by means of which it will be possible to dry the basin above the lock, and thus remove the guard and lock gates at any time necessary.

HAMILTON, ONT.—E. A. C. Pew, the railway promoter, had an interview with the Council regarding his proposition to bring electric power to Hamilton by a waterway from the Grand River, and stated that as soon as a franchise was granted work would be proceeded with.

BRANTFORD, ONT.—The Brantford Electric Light and Power Company are offering for sale the Brantford canal level and electric lighting and power plant, consisting of land, dams, buildings, engines and boilers, arc dynamos, generators, etc., together with the company's franchises. Tenders close on the 26th inst., and are to be addressed to John McGeary, secretary-treasurer, or Wilson & Watts, solicitors.

MONTREAL, QUE.—There was a meeting of the gentlemen interested in taking over the charters and stock of the Citizens' Light and Power Company. A board of directors and officers were elected. The valuable charters of these two companies are now in new hands and will be pushed with all possible haste. The capital of the new companies will be placed at $1,000,000, and will probably be increased at no distant date to $2,000,000. The gentlemen at the head of the electric companies are those who are interested to a great extent in the Lachine Rapids Hydraulic - Land Company, and it is understood that those having stock in the latter will be privileged to purchase a like number of shares in the electric companies. The title of both the electric companies will remain unchanged, each company being to a great extent a distinct organization.

MONTREAL, QUE. — The much-talked-of meeting at which the charters of the Citizens' Light and Power Company and the Standard Light and Power Company were transferred into other hands was held November 28 and excited much interest. It was stated, in the *Gazette* of last Thursday, that the controlling stock had been bought up by some of the largest shareholders in the Lachine Rapids Hydraulic and Land Company. At yesterday's meeting, November 28, only two of the old board of directors were elected, and the new ones are shareholders in the Lachine Rapids Hydraulic and Land Company. The new board now consists of Messrs. R. Wilson Smith, Jeffrey H. Burland, W. McLea Walbank, M. P. Davis, Ald. Peter Lyall, O. L. Henault, Mayor of St. Gunegonde, and F. Dagenais, ex-Mayor of St. Henri. Of these seven, Messrs. Henault and Dagenais are the only representatives on the old board. The title of both the new companies will remain the same as hitherto, and the capital at present will be placed at $1,000,000, with the probability of $2,000,000 in the near future. The purchasing of the controlling stock in the two companies places the company in an independent position, for they have thus gained a market for their electricity when ready. As regards the refusal of the City Surveyor to locate the poles of the Citizens' company, that company has a notarial agreement with the city by which it is stated that the City Surveyor should locate poles in the various streets. This, however, he refuses to do at the advice of the City Attorney. The poles, when laid, will run from St. Luke street to Guy, to Sherbrooke and to Simpson streets, up Simpson to Pine avenue, to Park avenue and up Park avenue to St. Louis de Mile End. The franchises that the two light and power companies own are the supplying of power of all kinds to St. Henri and St. Gunegonde, the street lighting of Westmount and St. Louis de Mile End and the lighting of the Montreal Harbor. J. A. C.

Montreal, November 29.

National Electric Light Association.

TO THE EDITOR OF ELECTRICAL REVIEW:

I take pleasure in advising you that the Executive Committee has selected Tuesday, Wednesday and Thursday, May 5, 6 and 7, 1896, as the time for holding our nineteenth convention, and Industrial Building, Forty-third street and Lexington avenue, this city, as the place.

The National Electrical Exposition Company, under the auspices of this association, and approved by the American Street Railway Association, will hold an electrical exhibition at the above place, beginning May 4 and continuing during the entire month. This company will communicate with you very soon, and we trust you will give the enterprise your hearty support. Respectfully,

GEO. F. PORTER, Secretary.

New York, December 2, 1895.

THE NATIONAL TELEPHONE COMPANY.

RECENT IMPORTANT WORK OF THIS COMPANY—TELEPHONES FOR AN ELECTRIC RAILWAY.

No one who is at all familiar with the interior of the big telephone exchanges of the country will deny that the immense multiple switchboards in connection with metallic circuits have represented the highest state of the art in telephony, and it has been deemed almost impossible to construct a telephone exchange without infringing more or less on patents owned or controlled by the American Bell company. It seems, however, that the National Telephone Manufacturing Company, of Boston, have been quietly working along new lines, and have recently completed and installed a telephone exchange in Mobile, Ala., which has proved an eye-opener to many interested parties. The Mobile service was installed for the Home Telephone Company of that city, and comprises a number of special devices of the National company of the utmost importance, and put into practical operation here for the first time in any exchange. The switchboard already installed and now in operation has a capacity of 800 drops, 500 of which are in use. No metallic-circuit construction has been necessary, induction coils have been dispensed with, and yet the service is completely free from all induction or cross-talk. These are points which cannot fail to interest every practical telephone man in the country.

The instruments themselves consist of a small portable telephone only nine inches in length, and a magneto bell box about three and one-half inches cube. The telephone is simply a receiver and transmitter in combination. Pressing a key in the handle of the combination throws the drop at "Central" and subscribers are able to communicate with each other in less time, while the system itself is more economical than anything now in use elsewhere. As before stated, no induction coils are necessary and all batteries are located at the central office. The Mobile exchange has now been in operation about a month, and so popular has it become with the general public that the Home Telephone Company have placed an order with the National company doubling the entire service and making an exchange of nearly 1,000 subscribers, which will probably be the largest exchange in the country installed by any independent telephone company. The men behind the Home Telephone Company are wealthy and representative business men of the city of Mobile, and before placing their contract with the National company one of their expert engineers visited every telephone manufacturer of importance in the United States. After adopting this course and weighing carefully the merits of everything presented to their notice, the final placing of their order with the National company carries its own suggestions.

The National Telephone Company have taken up another line of work which appeals directly to the street railway men, and the first installation is now under way on the line of the Braintree & Weymouth Street Railway Company. The idea is to put every car on any portion of the line in direct and immediate connection with the power house or headquarters station, so that in case of accident or delay of any kind the conductor can telephone for help or for instructions. The construction is simplicity itself, and consists merely of an ordinary No. 10 iron wire strung along the poles over the entire system, starting from and returning to the power house. Connected with this wire and at convenient distances apart are little water-tight switch boxes fastened on the poles. Each car is provided with a small portable combination receiver and transmitter, connected by a short cord to a contact plug. In the event of accident the conductor can cut into the nearest switch box, press the key in the handle and communicate immediately with headquarters. The few batteries necessary for the working of the line are located at the power house, and the whole outfit to be carried may be put into a coat pocket. The advantages of the system will be readily apparent to any practical street railway man, and he will probably not think twice about adopting it. The circuit of the Braintree & Weymouth road, where it is now in operation, is some 12 miles in length, and the superintendent states that if they had had it on the occasion of a recent derailment of several of their cars at an outlying point, it would have paid for itself twice over right at that time. It is something every street railway company needs, particularly suburban lines, and will no doubt meet with ready appreciation. H. G. T.

Boston, Dec. 7.

Buffalo Engineering Company.

State Engineer and Surveyor Campbell W. Adams has given to the Buffalo Engineering Company, of Buffalo, N. Y., an order to go ahead with plans for new lift locks at Lockport. There will be two sets of locks, consisting of two distinct plants. Each lock will be 225 feet long, 20 feet wide and 10 feet in depth, capable of holding two boats. The lock tanks will be suspended on steel wire cables, counter-balanced by a dead weight, operated by hydraulic power. These locks, with the aqueducts, will cost about $500,000.

Mr. C. M. Morse, who is at the head of the Buffalo Engineering Company, and Mr. F. M. Sylvester will have special charge of the work. Mr. Morse's many friends in the electrical field will be pleased to learn of his good fortune in this matter.

We have received from the authors "Note on a Photographic Method of Determining the Complete Motion of a Gun During Recoil," by Dr. Albert Cushing Crehore, assistant professor of physics, Dartmouth College, and Dr. George Owen Squier, first lieutenant, third artillery, U. S. A.

The Lombard Hydraulic Brake for Street Cars.

The accompanying illustrations show the Lombard hydraulic brake, manufactured by the Lombard Water-Wheel Governor Company, 61 Hampshire street, Boston, Mass.

Fig. 1 shows the box, which is about 30 inches long, 12 inches wide and eight inches deep, containing the piston and pump cylinders connected with the pressure tank, which is about 38 inches long and six inches in diameter, the whole apparatus weighing about 150 pounds. The box may be placed anywhere under the car floor where the sprocket wheel can be connected with the axle to get power to drive the pump. The tank may be placed anywhere that can be reached by piping to connect both sides of it to the box containing the brake and pump cylinders, preferably under the seats of the car. This tank is partitioned into two chambers. The larger chamber is filled two-thirds full of oil and is charged with air compressed to about 220 pounds pressure. The smaller chamber is practically a vacuum. A safety valve is placed on the pressure end of the tank. The pressure gauge may be placed anywhere on the car.

Fig. 2 shows the brake cylinder and pump arrangement of the valve, operating mechanism. It will be observed that this shaft, having a small crank at one part of it, driven by the sprocket wheel and chain from the axle, is connected to the piston rod of the pump by means of a fork connecting rod giving a reciprocating motion to the piston. The piston and valves are so arranged as to make it a single-acting pump. The brake-operating piston, the larger of the two having a rod projecting outside of the casing, is so arranged as to receive the brake-chain coupling at A. Any movement of the piston will operate the brake lever and so set the brakes of the car. It is also connected with the valve by rod B. This piston and rod may travel 10 inches and is two and one-half inches in diameter, taking 18.84 cubic inches of oil or about one pint to fully extend the brake rod. Rod C operates the three-way valve which controls the setting or releasing of the brake, and is operated by a handle at either end of the car. Pipe connections D make a closed circuit for the fluid to pass from the pressure tank through the brake piston setting the brake and exhausting into the vacuum, then being pumped back into the pressure tank by a few strokes of the pump through channels in the pump castings and pipe, thus continually maintaining the pressure and vacuum, the piping being so arranged that oil and never air enters the brake cylinder. The iron casting is partly filled with lubricating oil and closed tightly, thus continually lubricating all parts needing it.

The power stored in this pressure tank consists of an electric air cushion of 220 pounds pressure and an inelastic fluid, which is in this case preferably oil; this fluid is used as a medium to transmit the stored energy of the air pressure from the tank to the brake-operating piston (see Fig. 2, A). Any movement of this piston will operate the brake lever and set the brakes of the car.

To operate this brake piston the pipe running from the three-way valve supplies the fluid under pressure to move the piston, all in accordance with the opening of the three-way valve which may be set at will by the operator. A compensating lever mechanism, shown in Fig. 2, will set the fluid valve so that the large piston can be held at any position or part of its stroke; that is to say, the piston can be moved forward to put the stroke on light or heavy or at any point desired and hold it there. The same three-way valve also regulates the release in the same way and controls the throwing off of the brake shoes so that the brake can be held at any grade of tightness desired and is under the entire control of the operator. As before stated, the oil is merely a medium of transmitting the power from the pressure tank to the operating-brake piston and from the force pump back to the pressure tank to restore the energy consumed. In this case the pump shaft only has to make four or five revolutions to return to the pressure tank all the oil used in its operation.

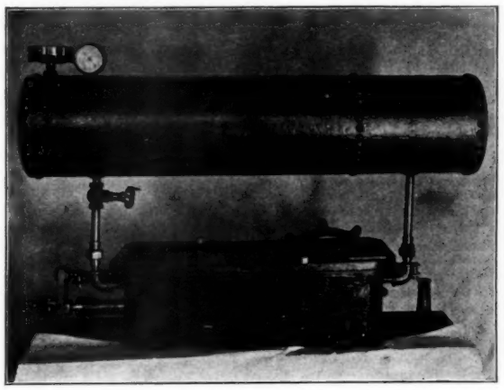


FIG. 1.—THE LOMBARD HYDRAULIC BRAKE.

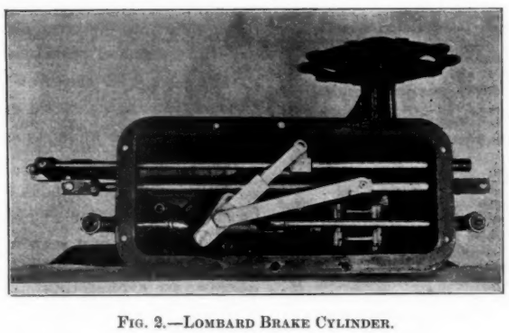


FIG. 2.—LOMBARD BRAKE CYLINDER.

The discharge of this hydraulic brake is also worthy of consideration. It is entirely noiseless; in fact, the discharging into the vacuum tank of the exhaust or discharge of the brake is instantaneous, although under full control of the operator, as the least movement of the handle changes the valve and the direction of the movement of the oil. The fact of using oil—an inelastic fluid—for transmitting the power gives several advantages to this brake. First, ease of maintaining the pressure. The compressed air does not leak out. Second, the simplicity of its operation. Any man who knows enough to operate the hand brake will control the car better with this brake on his first trip than he can with the old brake, because the least movement of his handle is instantly answered by the quantity of oil behind the brake piston and consequently the amount of pressure of the shoes on the wheels. In going down grade he can ease off a less amount of pressure than by any other brake, controlling his speed absolutely. In making a start on an up-grade the same facility enables him to hold the car at just the point at which the wheels would begin to revolve, then applying the power the easy release of the brake allows the starting without a hitch or jerk. He can make the ordinary stops in about one-half the time or distance that he can by his hand brake, and make his trip in 10 per cent better time. The same facility to ease off his brake a little and still hold, if he sets it harder than necessary, prevents the skidding of the wheels. For an emergency stop his natural way is as in ordinary stops, simply to pull the handle, opening the three-way valve and the whole force is instantly applied and stays on even if the motorman jumps. The controlling rod is so placed that a collision would tend to open the valves and set the brakes. Emergency stops are said to have been made in six feet.

The Metropolitan Supply Catalogue.

The Metropolitan Electric Company, of Chicago, has recently received from its printers 10,000 copies of its new catalogue of general electrical supplies. This is the most complete catalogue and the largest of its kind that the trade has ever seen. It has 755 pages, is elaborately illustrated and its descriptive matter is especially full and exact. It is a one-volume encyclopedia of electrical supplies.

In a recent letter to the trade the Metropolitan company states that it will cost 50 cents to send a copy of this catalogue by express, and suggests that any one in need of electrical supplies now or in the near future send in an order and a copy of the catalogue will be packed with the goods.

Automatic Telephone Switch Patents.

TO THE EDITOR OF ELECTRICAL REVIEW:

Kindly advise us when the patent on the automatic telephone switch expires. We understand it to be the Watson patent. We have seen the fact stated, but can't lay our fingers on it now. An early reply will oblige,

Yours truly,

SUBSCRIBERS.

December 2, 1895.

[The controlling patent on the automatic telephone switch is Roosevelt No. 215,837, of May 27, 1889. It will expire on May 27, 1896.—ED.]

The Electrobat.

It was reported last Friday that the $2,000 prize for the best horseless carriage in the *Times-Herald's* contest on Thanksgiving Day, at Chicago, had been awarded to Morris & Salom's electrobat, on the merits of absence of sound, vibration, heat and odor. The electrobat was equipped with the Electric Storage Battery Company's chloride accumulators and was illustrated and described in the ELECTRICAL REVIEW for November 6, 1895.

The Berliner Case.

Attorney-General Harmon in his report asks Congress what he shall do in the Bell telephone litigation. He says the expense will be heavy and it will take six months to prepare rebuttal testimony. If the government has the money, he recommends that it defend its right to sue to annul the patent.

Franklin Institute.

Prof. A. E. Dolbear will lecture on Thursday evening, December 19, before the electrical section of the Franklin Institute, of Philadelphia, on "Mechanical Conceptions of Electrical Phenomena."

The steel rail pool has been reorganized for 1896, including the plants of Carnegie, Illinois Steel, Cambria, Lackawanna, Bethlehem and Ohio Steel companies. The Pennsylvania Steel Company, Colorado Fuel and Iron and other producers are controlled by agreement.

ELECTRICAL REVIEW

Published at 13 Park Row,

P. O. Box 2889. NEW YORK.

EDITOR: CHARLES W. PRICE.

ASSOCIATE EDITOR: STEPHEN L. COLES.

REGISTERED CABLE ADDRESS: "ELECTVIEW." NEW YORK.

1546 "CORTLANDT," TELEPHONE CALL.

BOSTON OFFICE: H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.

WASHINGTON OFFICE: GEO. C. MAYNARD, 800 H St., N. W.

SUBSCRIPTION TO THE ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 6.00
Single Copy, - - - - - - - .10
Back Copies, each, - - - - - - .25

SPECIAL NOTICE TO ADVERTISERS

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, DEC. 11, 1895.

CONTENTS.

	PAGE
Views, News and Interviews	329
Electric Carriages in Cleveland	329
A Giant Electric Crane	329
National Carbon Company Sued	330
Telephone News and Comment	330
The Metropolitan Traction Company	330
The Standard Telephone Company	331
Our Canadian Letter	332
National Electric Light Association	332
The National Telephone Company	332
Buffalo Engineering Company	332
The Lombard Hydraulic Brake for Street Cars	333
The Metropolitan Supply Catalogue	333
Automatic Telephone Switch Patents	333
The Electrobat	333
The Berliner Case	333
Franklin Institute	333
Wall Street and the Electrical Stock Market	334
Electric Locomotive No. 2 Put Through Severe Tests	335
A Letter From a Baltimore Telephone Man of Interest to the Standard Telephone Company	335
Personal	335
Gould vs. Hain	335
Obituary	335
The Lundell Motor on the Electrobat	336
An Injunction Granted on Edison Lamp Patents	336
A New Electric Light Company for Brooklyn	336
Silvering Mirrors by Electricity	336
Contemporary Electrical Science	336
The Passing of the Veterinary Surgeon	336
Resignation of Mr. E. F. Peck	336
Zimdars & Hunt Employees' Electrical Ball	336
Electricity at Atlanta	336
Western Telephone Construction Company	336
New York Electrical Society	336
Incandescent Lamps for Two Hundred and Twenty Volts	336
Electricity the Power for Elevated Roads	336
Storage Battery Applications	337
Electric Railway Notes	338
Glucinum	338
Municipal Telephony	338
The Crown "K" Woven-Wire Brush	339
Advance Information	340
"Harnessing" Niagara	341
Medical Batteries	341
The Electrical Industry	341
Electrical Engineers and Insurance Men	341
Electrical Patents	342
Electric Light Flashes	xi
Trade Note	xi
Kindred Interests	xii

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xviii
American Electrical Works, insulated wire	i
Armington & Sims, engines	xviii
Bristol Co., voltmeters and pressure gauges	i
Bunnell & Co., J. H., dry batteries	i
Columbia Incandescent Lamp Co.	i
Currier, Mayo & Co.	ii
Day's Kerite, insulated wire	i, x
Electric Appliance Co., supplies	i
Goubert Manufacturing Co., heaters	xviii
Greeley, E. S., & Co., The, electrical supplies	xviii
Hampson, E. P., & Co., engines	xviii
Interior Conduit and Insulation Co., Lundell dynamos and motors	i
Law Battery Co., open circuit batteries	i
Lombard Water-Wheel Governor Co.	xviii
McKenney & Waterbury, electric light fixtures	i
National India Rubber Co., wires and cables	i
New York & Ohio Co., Packard lamps	i
Okonite Co., insulated wire	i, xviii
Partridge Carbon Company, motor and generator brushes	i
Rhode Island Tool Co.	xviii
Safety Insulated Wire and Cable Co.	i
Standard Electric Co., arc lighting	i
Stirling Co., water tube boilers	xviii
U. S. Telephone Construction Co., "M. & B." telephones	i
Weston Engine Co., engines	i

INSIDE PAGES.

Adams-Bagnall Electric Co., arc and incandescent lamps	iii
American Bell Telephone Co.	xv
American Electric Telephone Co., long-distant telephones	xiv
Bain, Forée, engineer	xiii
Baker & Co., platinum	vi
Ball & Wood Co., engines	iii
Baxter, H. E., & Co., electrical supplies	x
Beacon Lamp Co., incandescent lamps	xii
Belden Machine Co., drop forging	iii
Benjamin, Geo. H., patents	xiii
Brady, T. H., Brady mast arms	341
Brill, J. G., Co., railway cars	x
Brixey, W. R., Day's kerite wires and cables	x
Bryant Electric Co., K. W. S.	342
Central Electric Co., interior conduit	iii
Chapman Valve Mfg. Co.	xvi
Consolidated Telegraph and News Co.	xii
Correspondence School of Technology	342
Crown Woven Wire Brush Co.	342
De Veau & Co., telephones	xv
Dixon, Jos., Crucible Co., belt dressing	xiii
Duval, W. S., Jr., patents	342
Dyer & Driscoll, patent solicitors	342
Eddy Electric Mfg. Co., Eddy generators	xiii
Electric Storage Battery Co.	ix
Empire China Works, porcelain specialties	xvi
Eppenger & Russell Co., Valentine subway electrical conduit	xv
Euler, H. C., mother-of-pearl	xi
Faraday Carbon Co., carbons	xvi
Fleming, W. H., woven wire dynamo brushes	iii
Fort Wayne Electric Corporation, "Wood" apparatus	vii
Garvin Machine Co.	vi
Gates Electric Mfg. Co.	ix
General Electric Co., electric light supplies	viii
Globe Electric Light Co., incandescent lamps	vi
Harrisburg Foundry & Machine Co., Harrisburg ideal engines	vi
Helios Electric Co., arc lamps	xiv
Heneken Electric Heating Co., electric car heaters	342
Homer, F. E., & Co., commutators	xvi
Hooven, Owens & Rentschler Co., electric railway and electric light engines	iii
International Correspondence Schools	342
Keystone Telephone Co.	xv
Leffel, Jas., & Co., water wheels	xvi
Lehigh Valley Creosoting Co., creosoted lumber	xii
Manhattan Electrical Supply Co., Mesco battery	341
Marshall, Wm., condensers	xii
Mason-Maxwell Telephone Mfg. Co.	341
Mather Electric Co., receiver's sale	341
McIntire, C. Co., The, connectors and terminals	xii
Metropolitan Electric Co., supplies	xi
Metropolitan Telephone and Telegraph Co.	xi, xii
Moore, Alfred F., insulated electric wire	vi
Morris, Tasker & Co., tubes, poles, etc.	viii
National Telephone Mfg. Co., telephones	xv
New England Engineering Co.	xiii
New York Belting and Packing Co., rubber belts	xvi
New York Insulated Wire Co	vi
Ostrander, W. R. & Co. supplies	xii
Partrick & Carter Co., electrical supplies for housework	342
Phillips Insulated Wire Co., wire	341
Read, Robt. H., patents	342
Replogle Governor Works	ix
Riesinger, Hugo, carbons	x
Rodrigues, M. R., premier baby	xvi
Royal Electric Co., alternators	v
Royce & Mareau, electrical supplies	xii
Safety Car Heating and Lighting Co.	iv
Schoonmaker, A. O., India mica	xi
Scott Electric Lamp Co.	xv
Situation wanted	xi
S. K. C. Specialty Co.	xvi
Solar Carbon and Mfg. Co., carbon specialties	xvi
Southgate, W. B., & Co., ammeters and voltmeters	iii
Standard Thermometer Co., arc lamps	vi
Stanley Electric Manufacturing Co.	viii
Stanley & Patterson, electrical supplies	iv
Stucky & Heck Electric Manufacturing Co.	xvi
Syracuse Storage Battery Co.	vi
Tice, Josiah, Lockwood telephones	xv
"Wanted."	xi
Warren, A. K., & Co.	xii
Washington Carbon Co., "Helios."	iii
Western Electric Co., supplies	xiii
Western Telephone Construction Co., telephones	xv
Westinghouse Electric & Mfg. Co., Sawyer-Man incandescent lamps	v
Weston Electrical Instrument Co., measuring instruments	x
White-Crosby Co., contracting engineers	xii
Whitney Electrical Instrument Co.	xii
Williams Mfg. Co., tanks	xiv
World Manufacturing Co.	xii
Wyckoff Seamans & Benedict, "Remington"	342

The Standard Telephone Company receives further attention at our hands in this issue. Mr. W. J. Atkinson's letter on the opposite page stamps him as an intelligent and plucky fighter, and we congratulate him on his effort.

A glance at the news columns of this issue of the ELECTRICAL REVIEW will show that the electrical societies of New York and vicinity are to have lectures galore within the next few days. All this is in the line of popular education on electrical matters. It is a good thing and there can't be too much of it.

A foreign exchange estimates that a November fog in London costs for electric light, gas, accidents, delays and damages about $500,000. We had a couple of fogs in New York city last month that were good ones, but they didn't cost as much as the London brand. Again is the economy of American products exemplified.

The New York *Herald* has performed a valuable public service in calling the attention of the proper State authorities to the fact that the coal oil used in the lamps in the cars of the Manhattan Railway Company is 150 degrees below the test required by law. This is a long step toward the total abolition of a primitive means of lighting, which should have no place in the first city of the United States.

The boom in the telephone business in Ohio is shown by the fact that telegraph and telephone companies invested $331,000 more new capital during the past year than in the previous year. This amount is nearly twice as much as was invested in 1894. We believe that several western and southern States, to say nothing of New York and the New England States, can show a record even better than this. We understand that the New York & New Jersey Telephone Company has spent about $1,200,000 cash in construction and reconstruction during the past year.

The elevated railway system of New York will yet, we advisedly predict, find the cure for its loss of patronage in the subtle and yet powerful electric current. If Colonel Hain, the general manager, would devote a little of his time and alert intelligence to this view of the case and consult with able electrical engineers, we are confident he would be convinced. We believe a few hours' conference with a progressive and capable electrical engineer, like Lieut. Frank J. Sprague, for instance, would be greatly to the advantage of his company.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The stock market this week ran to the industrials. Transactions were very heavy and fluctuations pronounced. Specific causes were responsible. The railroad list was quiet and possessed a sagging tendency. Capital has interpreted as unfavorable the delay on the part of Congress in currency and revenue legislation. The well informed claim the programme is to postpone action until some time in January. In order to make this the more secure there will be another raid upon the gold reserve with the assistance of January 1 disbursements calculated to reduce that fund below 60 millions. This, it is thought, will furnish an object lesson to Congress. It will also result in lower prices for securities. Knowledge of this fact is deterring purchases, rendering the market hesitating. Trade news, while not encouraging, is not bad. Prices of staples are somewhat better, although the volume of business is small.

The electrical field was without particular feature. The bears still hammer Western Union on the idea that the recent Supreme Court decision, throwing the Union Pacific road open to competition, must result in much lower prices for the stock. The directors will consider the payment of a quarterly dividend next week. The indications are that the regular 1¼ per cent will be declared. General Electric was unusually quiet within a narrow range. The high point was reached on Thursday, being 31½. The preferred stock of the company sold at 60 in Boston.

On the Boston exchange, Bell Telephone was quiet at 199 @ 200. Erie Telephone gained 2 points to 52; New England, 1⅞ to 87⅞. Westinghouse securities were unchanged at 34¼ @ 34½ for the common and 54½ @ 55 for the preferred. In Philadelphia, Electric Storage Battery was quiet as compared with its record of previous week. Its opening was 36 for the common, 39⅜ for the preferred. The low was 35 and 36¾, respectively.

In a table accompanying is given the usual monthly comparison of the bid and asked prices of various inactive electrical stocks. No important changes other than those incident to temporary market fluctuations are recorded except in a few instances. In the telephone and telegraph list the Western Union decision did not have the effect upon prices expected. Values as a rule are slightly lower, which is due to a generally lower range of quotations than was current a month ago. One of the most important declines was in Erie Telegraph and Telephone of 8 points, due to the collapse of a speculative bubble in that stock. The heaviest decline was recorded in Electric Storage common and preferred. The decline in the common has been from 72½ to 35 and in the preferred from 75 to 36. The causes have been fully set forth from time to time in this column and a reiteration at this time is not necessary. Specialists report

a moderate demand for the better classes of securities although nothing at all important. The table follows:

	Dec. 7.		Nov. 7.	
ELECTRICAL:	Bid.	Asked.	Bid.	Asked.
Boston Elec. Light...	111	113	...	113
Bridgeport Elec. Light	35½	....	35½	....
Edison El. Ill. Boston..	....	150	....	150
" " " Brooklyn	103¾	106	107	107¾
" " " Chicago.	....	123	124	124¼
" " " Phila....	135	137	..	...
" " " New York	95	*97½	96½	96½
" " " St. Louis.	15	20	15	20
Ed. Lt. & P. San Francisco	91	94	....	....
Hartford Elec. Light..	102	....	102	....
Elec. Storage Battery..	35	....	72½	....
" " " Pfd	85	....	75	....
Int. Conduit & Ins. ...	25	35	....	....
Lowell Electric Light..	90	95	90	95
Narragansett Elec'ric.	83¾	84	84	85
Penn. H., L. & Power..	13½	13¾	....	....
U. S. Electric Light....	131⅛	133½	135	140
TELEGRAPH:				
American District.....	35	40	30	40
Cent. & S. American..	124	125	123½	126½
Commercial Cable....	165¾	168¾	156	....
Gold & Stock.....	108	....	107½	....
Mexican	195	200	190	200
Postal.....	81½	82	81½	83
Western Union.....	87¾	88	91	91¼
TELEPHONE:				
Bell...	199½	200	197½	198
Amer. Graphophone..	3⅜	3⅝	3	3⅛
Bell of Mo.....	175	200	175	185
Chicago.....	165	....	....	....
Erie Tel. & Tel.....	60	62	68	68½
Hudson River.....	36	40	38	40
Mexican.....	75¢	80¢	80¢	85¢
New England.....	85	80	88½	89
New York & New Jersey	120	122	123	125
Southern New England	99	101	99	101

On Thursday Commercial Cable declared the regular quarterly dividend of 1¾ per cent, payable January 2 to holders of record December 20. BAIN.

New York, December 7, 1895.

Electric Locomotive No. 2 Put Through Severe Tests.

Electric locomotive No. 2, the latest electric giant put on the Belt railroad, added new laurels on Monday night to the noteworthy performances of locomotive No. 1, says the Baltimore *Sun*.

No. 2 hauled 28 loaded cars, two "dead" engines and a caboose, a total weight of about 1,400 tons, through the tunnel at the rate of 23 miles an hour. The train entered the tunnel at a speed of 20 miles an hour. A stop was made in the tunnel and with all drawbars stretched the start was again made without a slip of the wheel. In doing this and accelerating the train up to the speed of 23 miles an hour a drawbar pull of 58,630 pounds was exerted. With this tremendous strain the engineers say the least jerk would have snapped a coupling pin and broken the train apart. From one of the locomotives on the rear end of the train, where a jerky motion would be felt the greatest, an entire absence of such a jar was noted. During the work an imput of 4,100 amperes at a pressure of 600 volts was measured. The test is regarded as the severest yet attempted by such a locomotive.

On the locomotive during the test were: E. W. Rice, vice-president of the General Electric Company; W. B. Potter, chief engineer of the company, and A. K. Baylor, of the railway department of the company, all of Schenectady, N. Y. Supervising Electrical Engineer Parker and Assistant Engineer Shepard were also present.

No. 3, which will complete the number of locomotives for the Belt line service, is now approaching completion at Schenectady and will be brought to Baltimore about January 1.

A Letter from a Baltimore Telephone Man of Interest to the Standard Telephone Company.

TO THE EDITOR OF ELECTRICAL REVIEW:

DEAR SIR: I feel under personal obligations to you for your fearless exposure of the Standard methods in the ELECTRICAL REVIEW of November 20 and 27, and I believe you are entitled to the thanks of every man in any way interested in the telephone business who believes that there is an opportunity at present for honest opposition to the Bell company. The opposition of a $5,000 company with $5,000 put in and used to install a real exchange is something more feared by the Bell company than all the oceans of water that can be injected into Standard stocks.

Mr. Barnes says in his letter that "the slanders against the Standard company were instigated in print over his signature in circular form by one Maxwell in Richmond, and that the clout has left that city. His mysterious disappearance is no doubt due to the fear that he will be arrested."

I enclose two circulars which I issued and circulated containing Mr. G. S. Maxwell's name, one being a reprint of Mr. Maxwell's advertisement printed in the Richmond *Times* of October 20, and the *Star* and *State* of October 18, 1895, offering rewards aggregating some $570 (if the Standard claims to the ownership of 46 telephone patents are true). Mr. Maxwell was in Richmond openly for weeks after the publication of these advertisements and his letter, and no attempt of any kind was made to interfere with him by the Standard company.

Every man connected with the Standard company in Richmond knows that these circulars were issued by me, as most of them state on their face, and that I have at all times been ready to back up the offers of reward, and also to increase them to any reasonable amount.

The charges that I have made against the Standard company over my *own* signature, and dared them to take into court, are:

1. The celebrated circular suggesting the bribery of councils was issued from the New York offices of the Standard company by its general manager, A. T. Nye.

2. That the claim was made in Baltimore more than three months ago, by men engaged in trying to sell Columbian Standard Telephone stock, that the company had secured a franchise in Richmond, had erected poles and were stringing wires; and

3. That the assertion of the Standard company in their advertisement in the New York *World* of October 27, which was repeated in numerous other places, that a committee of experts had investigated and approved of the telephone exhibited in Richmond, was absolutely false.

I enclose copy of a letter received from George W. Cross, general manager of the Standard company, threatening to take me into court, and of my answer to him. It may be of interest to you for me to add that on this letter-head appeared the name of N. H. Shea as secretary. Mr. Shea is a wholesale grocer of Washington, and had resigned as secretary several months before. I have Mr. Shea's letter in my possession stating that the reason for his resignation was the failure of the Standard company to give him satisfactory proofs that they owned the patents they claim to own.

I have similar letters from others, formerly Standard directors, and letters from men who are still directors in the Standard local companies. Respectfully yours,

W. J. ATKINSON.

Baltimore, December 6, 1895.

THE LETTERS.

The following letters are the copies referred to by Mr. Atkinson:

THE THREAT.

BALTIMORE, October 28, 1895.

MR. W. J. ATKINSON,
General Manager Home Telephone Company,
Baltimore, Md.

DEAR SIR: I am instructed by General Manager Nye, of the Standard Telephone Company, New York, to notify you that you personally, and the companies you represent, will be held responsible for the malicious and false circulars you have issued with and without signature in reference to the business of the Standard Telephone Company.

Yours truly,
GEORGE W. CROSS, General Manager.

THE HOT REJOINDER.

BALTIMORE, October 29, 1895.

MR. GEORGE W. CROSS,
General Manager Standard Telephone Company,
city.

DEAR SIR: I take pleasure in acknowledging the receipt of your favor of October 28 and will be glad to have an early opportunity of proving in court every charge I have made against the Standard Telephone Company.

I will further say that you personally know a portion of the advertisement of the Standard Telephone Company in the New York *World* of last Sunday is false. Possibly you do not know that the sheriff took possession of the New York office of the Standard Telephone Company last Friday, and although they succeeded in getting him out on Saturday, he is likely to visit them again shortly.

Respectfully yours,
W. J. ATKINSON.

PERSONAL.

Mr. A. G. Eneas, of Boston, manager of the New England district for the Dynamo Electric Maintenance Company, favored the ELECTRICAL REVIEW with a call last week. Mr. Eneas was accompanied by Mr. R. F. Ogilvy, who will have charge of the company's branch office in Philadelphia.

Mr. Francis R. Upton has resigned his position as general manager of the General Electric Company's lamp department at Harrison, N. J., and has accepted a responsible position in the general manager's office of the National Tube Works, at McKeesport, Pa. Mr. Upton has been connected with the electrical field for many years, and was one of the first to be associated with Mr. Edison in his early work. The ELECTRICAL REVIEW wishes him abundant success in his new field of labor.

Mr. Oscar Hoppe, of Elmira, N. Y., will take charge of the Columbia Incandescent Lamp Company's New York office in the Havemeyer Building. Mr. Hoppe is a very talented gentleman and possesses musical and linguistic accomplishments of a high order. The ELECTRICAL REVIEW hopes he will meet with full success in his new position. Mr. Fred C. Wilson, formerly of Hartford, Conn., has also been engaged by the Columbia company as a traveling representative. He will make his headquarters at the company's New York office.

Gould vs. Hain.

The New York State Assembly Committee on Railways concluded last week its investigation of the local transit facilities of New York city. On Thursday last the affairs of the Manhattan Railway Company were gone into. Mr. George J. Gould, president of the company, was the most important witness examined. He is reported as saying, in answer to questions asked by the committee's council:

"In my opinion, an elevated road equipped with electricity would afford the best means of rapid transit. We are watching electrical methods very closely and propose to try experiments on the suburban road."

In the ELECTRICAL REVIEW for October 23, 1895, was published an interview with Col. F. K. Hain, general manager of the Manhattan Railway Company. A part of this interview, which caused widespread comment at the time, is represented below:

The representative of the ELECTRICAL REVIEW asked: "Colonel Hain, will you state definitely whether the Manhattan Railroad Company is at the present time considering the immediate introduction of electricity on the elevated system in this city?"

In reply, Colonel Hain said: "We have no definite plans in reference to the matter and I see no reason for believing that electricity is likely to be used on the elevated during the next year, or, in fact, during the next two or three years."

The representative then asked: "Do you believe that the transportation question in the near future will be solved by the use of electricity?"

To this Colonel Hain responded: "I don't believe that it will be to any greater degree than at the present time, and, in fact, I don't think that during your lifetime it's likely to come."

Has Mr. Gould talked with Colonel Hain since the publication of the interview mentioned? Who has experienced a change of heart on the question of electrical equipment for the elevated roads? When such a wide difference of opinion exists between the president and general manager of the company, it is no wonder that the patrons of the elevated roads suffer from inadequate service furnished by totally antiquated rolling stock.

OBITUARY.

We regret to announce the death, on December 5th, of Thomas MacCoubray, who was widely known among electrical men, especially in the lighting field. He was of Scotch-Irish extraction, and was born in the District of Columbia on May 20th, 1817. Mr. MacCoubray was a thirty-third degree Mason and had held many offices in Masonic bodies. At one time he was secretary of the National Electric Light Association. Of late he had devoted his time to perfecting an auto-telephone system.

Prof. Francis B. Crocker will deliver a lecture on "Methods of Driving Dynamos" before the Henry Electrical Club, of New York city, on Friday evening, December 13.

The Lundell Motor on the Electrobat.

Once again the Lundell motor has gained notoriety for its superior qualities. This time it piloted to a successful finish the electric carriage, manufactured by Messrs. Morris & Salom, of Philadelphia, which was entered in the recent motocycle contest held in Chicago. The coveted gold medal was awarded to Messrs. Morris & Salom. Safety, ease of control, absence of noise, vibration and heat and general excellence of design and workmanship were some of the factors which the Lundell machine had to meet, and did meet successfully. The Interior Conduit and Insulation Company, of New York, who manufacture the Lundell motors, are again to be congratulated upon this, the latest popular recognition of the merits of their machines.

An Injunction Granted on Edison Lamp Patents.

On November 29 Judge Lacombe, of the United States Circuit Court of the Southern District, New York, granted a perpetual injunction to the General Electric Company against the Bryan-Marsh company, of New York, on two incandescent lamp patents. The entry was by agreement, and damages assessed at $1. The patents were issued to Edison June 14, 1881 (No. 242,896), and December 6, 1886 (No. 353,783), and both relate to the anchoring of the filament from the stem or mount of the lamp.

The decision, it is understood, will not interfere with the manufacture of lamps by the Bryan-Marsh company, as the patents do not relate to any process in use by them in manufacturing their present product.

A New Electric Light Company for Brooklyn.

Mr. Charles Cooper, of the Kings County Electric Company, has purchased the original plant of the Citizens' Electric Illuminating Company, at 53 Liberty street, Brooklyn, N. Y. It is understood that the plant will be entirely remodeled and equipped with Fort Wayne apparatus. Mr. Cooper was the first president of the Citizens' company, and has associated with him in the Kings County Electric Company Mr. Mirabeau L. Towns, the poet-lawyer of Brooklyn. The Kings County Electric Company is apparently getting ready to actively enter the Brooklyn electric lighting field.

Silvering Mirrors by Electricity.

A curious method of silvering mirrors has recently been patented by M. Hans Boas, of Kiel, says London *Engineering*. It is based on the fact that when one of the heavy metals forms the cathode of a vacuum tube, containing a trace of hydrogen, this metal is volatilized by the current, and is deposited as a firmly adherent and highly polished layer on the walls of the tube. The mirror thus produced is of much greater brilliancy than is obtained by the more orthodox methods.

Contemporary Electrical Science.

An accurate method of measuring specific inductive capacities is described by H. Pellat in the November *Journal de Physique*. It is founded upon the increase of attraction between the armatures of a charged condenser on replacing the air between them by the dielectric under investigation. The way this is managed is by an attracted disk electrometer with two disks attached to the top and bottom of a vertical rod and suspended by one arm of a balance between two attracting disks above and below. The attracted disks are surrounded by stationary guard rings. After equilibrium is established, a slab or layer of the dielectric is placed upon the upper guard ring and the upper attracting disk is shifted until equilibrium is once more established. This point is determined by observing through a telescope the motion of the rod carrying the attracted disks. This method can be carried to a point of extreme accuracy and the practical limit only lies in the measurement of the thickness of the dielectric. Liquids can be dealt with in the same way, by putting them into flat dishes, or they may be introduced between the lower pair of disks in contact with the metal itself. Wladimir de Nikolaieve introduces us to the somewhat unfamiliar phenomena of magnetic self-induction, by a discussion of the cause of the repulsion of Elihu Thomson's ring. "A piece of iron," he says, "attached to the end of the core of an electro-magnet will drop off if a disk of copper is moved along the core. An increase of the magnetizing current is observed at the same time. This diminution of the attraction of the iron is due to magnetic self-induction." If there are magnetic (displacement) currents, why not magnetic self-induction? E. von Aubel and R. Paillot scrutinize the validity of the law enunciated by Wiedemann and Franz, that metals of fairly good thermal conductivity have an electrical conductivity varying in proportion. Taking the case of aluminium bronze, "constantane" and ferro-nickel—all alloys of high electrical resistance—they find that this law is anything but verified, although a rough kind of correspondence may be observed. The law evidently holds for pure metals only of homogeneous structure.—*London Electrician.*

The Passing of the Veterinary Surgeon.

A curious fact in connection with the growth of electric street railways was brought out at a recent meeting of the corporation of McGill University at Montreal. The deans of the different faculties reported the number of students as 1,193, there being an increase in all except that of veterinary science. Dr. McEachren explained the decrease in this subject by the fact that the displacement of horses by electricity for street car purposes had greatly reduced the business of veterinary surgeons.—*Canadian Electrical News.*

Resignation of Mr. E. F. Peck.

Mr. E. F. Peck, who for over 10 years has been the efficient and progressive superintendent of the Citizens' Electric Illuminating Company, of Brooklyn, N. Y., resigned that position on December 1. On the evening of November 30 Mr. Peck was given a reception and dinner at the Montauk Café by 40 of his old employés, who, at the same time presented to him a solid silver wine cooler suitably inscribed. Mr. Peck's many friends will be pleased to learn that he does not intend to sever his connection with electrical work, but will be prominently identified with a new electrical manufacturing company.

Zimdars & Hunt Employees' Electrical Ball.

On the night of December 16 the Central Opera House in Sixty-seventh street, New York city, will again be the scene of merry-making, when the associated employees of the electrical firm of Zimdars & Hunt have decided to hold their second annual ball.

A feature of the ball will be the electrical decorations. There have been prepared many electrical designs, banners, mottoes, etc., which, when completed and installed, promise to make a beautiful display.

Electricity at Atlanta.

A Southern newspaper thus describes a night scene at the Atlanta Exposition:

"And while we watch the hundreds of incandescents that diadem the dark as if the javelin of some god had made so many glittering punctures in the black robe of the night, a serpent of flame winds itself about the white tower of the lake, the water shares the dazzling aspect of the land and the bed of Clara Mere seems strewn with diamonds."

Western Telephone Construction Company.

The Western Telephone Construction Company is now fully established in its new and commodious factory at 250 to 254 South Clinton street, Chicago. Mr. J. E. Keelyn is the active and energetic president of this company, which is now turning out complete telephone apparatus of all kinds and has installed a large number of exchanges, especially in the Western and Southern States.

New York Electrical Society.

A meeting of the New York Electrical Society will be held at the "Marble Church," Twenty-ninth street and Fifth avenue, on Thursday, December 12, at 8 P. M., when Mr. George G. Wacker, the well-known organ builder, will deliver a lecture accompanied by instrumental illustrations on the subject of "Electricity in Organ Playing."

Incandescent Lamps for Two Hundred and Twenty Volts.

The Columbia Incandescent Lamp Company, of St. Louis, are filling a large number of orders for 220-volt incandescent lamps. This particular type of Columbia lamp is said to be meeting with gratifying success among consumers.

Electricity the Power for Elevated Roads.

On November 25 last the most furious snowstorm in 24 years visited Chicago and up to noon of the following day practically cut her inhabitants off from the outer world. The wind blew in a gale, bringing with it first snow and then rain, and Chicago was turned into a sea of impassable slush. The temperature dropped below freezing and the moisture collected on the roofs and walls and in the streets became a solid mass of ice, upon which for hours beat hail and sleet. Telephone, telegraph, electric light and trolley wires, weighted as they were with the accumulation of snow and ice which had settled on them, snapped and fell in all directions. The police and fire departments were paralyzed and surface transit was completely stopped. Not a trolley car, cable car or horse car moved except at exceptionally long intervals and with the greatest difficulty. The residents on the outskirts of Chicago could not reach their homes and the night population of Chicago became for this occasion far beyond the normal.

Those, however, who lived along the lines of the elevated roads found some relief. By dint of hard work those operated by steam were able to get trains through, but not without considerable delay, the roads being blocked by fallen poles and wires erected in the streets through which they run.

The sole exception, in all this time of travel tribulation, was the Metropolitan Elevated Railway, of Chicago, which is operated entirely by electricity. No stoppage of moment occurred on this line and the motor-driven trains ran under a shortened headway, satisfactorily carrying, not only the ordinary quota of passengers, but thousands of those who usually depend upon the surface lines to take them home. At the Madison street station the crowd was so great that the station and stairways became jammed with the constant influx of people, upon which for several hours the removal of those carried off by the electric trains hardly made any impression.

Throughout the entire duration of the storm service on the Metropolitan Elevated Railway suffered only two short interruptions. The first lasting nine minutes; the road being rendered impassable on account of a fire in a building adjoining the track. The second of five minutes occasioned by a slight defect in one of the cars.

This severe storm, made up of almost every kind of climatic unpleasantness imaginable, put the electric elevated railway to the severest test that could have been conceived. And yet in spite of the difficulties which put a stop to surface transit, which interrupted for hours the steam suburban traffic and the steam elevated roads, the electric road was hardly affected.

Such a record as this especially emphasizes the superiority of the electrically operated road over roads operated by steam, and serves also as an object lesson which the elevated roads in New York and Brooklyn might take to heart.

STORAGE BATTERY APPLICATIONS.

A Topical Discussion before the American Institute of Electrical Engineers, New York and Chicago, November 20, 1895.

COMMUNICATION BY DR. FRANCIS B. CROCKER ON THE "USE OF STORAGE BATTERIES IN ELECTRIC LIGHTING."

The function of accumulators is to receive electrical energy at one time or place, and to give it out at some other time or place.

The principal uses to which they may be put in electric lighting are the following:

1. To supply portable electric lamps.
2. To take up fluctuations and thus steady the voltage or current.
3. To furnish energy during certain hours of the day or night and enable the machinery to be stopped.
4. To aid the generating plant in carrying the heavier load which usually exists for only an hour or two.
5. To make the load on the engines more uniform by charging the battery when the load is light.
6. To transform from a higher to a lower potential by charging the cells in series and discharging it in parallel, or *vice versa*.
7. To subdivide the voltage and enable a three or a five-wire system to be operated with a single dynamo.
8. To supply current from local centers or sub-stations.

Each of these applications will be considered separately in the above order.

I—PORTABLE ACCUMULATORS.

The accumulator is practically the only means of supplying portable electric lamps or those which are not connected to a dynamo even if they are stationary.

The primary battery is expensive and troublesome to operate, and it has never been commercially successful for electric lighting, except where only a few small lamps are required. Nor is there any other satisfactory primary source of electrical energy except the dynamo driven by mechanical power. It is therefore practically essential to adopt accumulators wherever portable electric lamps are used.

The serious drawback with portable accumulators is their great weight. For example, a standard size which weighs 100 pounds, yields 10 volts and five amperes, or 50 watts for 10 hours, which is just sufficient to feed one ordinary incandescent lamp of 16 candle-power. This weight would be prohibitive in most cases in which the only way to carry the battery was by hand, but it might be allowable for lighting railroad trains, where the weight would not be so objectionable.

Their great weight would also discourage in most instances the use of accumulators for supplying lamps in places which are not connected to a generating plant, the batteries being carried back and forth from a charging station. This method might be resorted to on special occasions, such as a fete, to which ordinary commercial limitations do not apply, but for regular lighting it would be troublesome and expensive.

Small accumulators are used to feed miniature lamps for medical or dental purposes, in which case their weight is not a serious difficulty, in view of the importance of the work and the small amount of energy required. Small batteries are also employed for theatrical lighting effects, in which the lamps and batteries are carried by the performers when it is not convenient to supply lamps by a wire connection.

II—ACCUMULATORS FOR PREVENTING FLUCTUATIONS,

due to unsteadiness in the driving power, are often applied successfully. A dynamo driven by a gas engine, for example, may vary periodically in speed because of the explosive action of the gas in the cylinder, and a battery connected in parallel with the dynamo will have the effect of steadying the voltage. But improvements in design and construction tend to reduce unsteadiness of speed, and by the use of a heavy flywheel and an elastic connection between the engine and dynamo the result is sufficiently satisfactory in most cases to make a battery unnecessary. An accumulator is generally installed in connection with a small gas engine lighting plant to enable the engine to be stopped for a considerable portion of the time, and thus save labor and attention, in which case the battery may also act to prevent fluctuations, but its principal function is the former one, which will be considered next.

A windmill electric lighting plant absolutely requires an accumulator, or some other means of storing energy, not only to eliminate fluctuations in speed which are constantly occurring, but also to bridge over the considerable periods of calm weather.

III—ACCUMULATORS TO ENABLE MACHINERY TO BE STOPPED

during certain portions of the day or night. The advantage of this application depends upon the fact that in almost every electric lighting plant there are long periods during the day and late at night when the number of lamps lighted is so small that it may not pay to run the generating machinery.

This plan also allows the machines to rest and cool down, which greatly facilitates cleaning and repair. In a hotel, residence, or on board of a yacht it may also be very desirable to stop the machinery and avoid the vibration and noise during the night. On the other hand, the addition of an accumulator to an electrical plant renders the latter heterogeneous, since the battery and its management differ so radically from the machinery and the handling of the same. It must also be remembered that the total investment is increased by the cost of the battery and its accommodation, because the generating plant is perfectly able to carry the load put upon the battery, since, by hypothesis, this load is a light one. Hence, the machinery might be run all the time, in which case the battery would be entirely unnecessary and sufficient rest for the machinery could be secured by using different machines for the periods of light load on successive days. These statements are based upon the supposition that the battery is not used to help the dynamos at the time of maximum load, since this case will now be considered separately.

IV—ACCUMULATORS TO AID IN CARRYING THE MAXIMUM LOAD.

If accumulators are substituted for a certain portion of the dynamo capacity, the question arises whether the substitution secures any advantage. In regard to first cost, authorities differ widely. These discrepancies probably arise from the confusion between kilowatt and kilowatt hour of output. Most accumulators have a normal time of discharge of about 10 hours, hence the cost per kilowatt hour is only one-tenth of the cost per kilowatt of output, and this would, of course, vary with any change in the time of discharge. In many cases it is specious and leads to mistakes to speak of kilowatt hours, to appreciate which fact we have only to realize that the kilowatt hour capacity of a dynamo is almost infinite since it might run for 20 years. The actual kilowatt of output, or, in short, how many lamps can be simultaneously fed, is the question in electric lighting. Moreover, in most cases, the time of discharge of an accumulator is unnecessarily long, and this is particularly true when it is used to help carry the heavy load which usually lasts only one or two hours. In this case the remaining hours of available discharge are of little or no use. If it be attempted to discharge more rapidly, both the capacity and efficiency are reduced, and in many types the condition and very life of the battery are injuriously affected by a high rate of discharge. What is needed for the maximum load or "peak of the load diagram" is an accumulator with a normal time of discharge of two or three hours and having a correspondingly smaller first cost, bulk and weight, that is, about one-quarter of those of the ordinary forms of battery, but certain types of cell are capable of discharging at this rate. It is evident that the time of charging need not be made as short as that of discharging, if it happen to be more convenient to charge less rapidly.

The use of accumulators to enable the machinery to be stopped, which is a case already discussed, usually demands a time of discharge of from 10 to 14 hours, which agrees quite well with the normal discharge rate of the ordinary forms of battery, but even then the time is unnecessarily long, since the average rate of discharge would rarely exceed one-half of the maximum rate. Consequently the battery would either be incompletely discharged or the rate would have to be made excessive at certain times.

V—ACCUMULATORS TO MAINTAIN UNIFORM LOAD ON THE ENGINES.

Steam engines are very inefficient at light loads. This inefficiency, in fact, is one of the chief sources of loss in an electric lighting plant, and the principal object of the engineer who designs and operates a station should be to reduce this waste to a minimum. The accumulator is the most important means of accomplishing this result, although there are other methods—such as gas, thermal (hot water) and steam storage, all of which have been carefully compared by Mr. Nelson W. Perry in a paper before the National Electric Light Association, February, 1895, "Storage of Energy Essential to Economy of Working Central Stations." Judicious selection of the number and sizes of the engines would enable them to be worked at a considerable fraction of their full capacity nearly all of the time, and it would seem that the same care that would be required to manage the battery might enable this to be accomplished. Nevertheless the accumulator gives more flexibility to the plant, and where introduced it often seems to considerably increase the economy of the engines by making their load more uniform and nearer their full capacity. According to the figures given by Mr. Perry in the paper cited above, an electrical horse-power costs $48.68 per annum when developed steadily, and costs $117.78 per annum with a variable load similar to that of an electric light station—that is, the latter costs about 2.4 times as much as the former. This ratio seems very high, but is borne out by statistics, which give a very large coal consumption for most electric light stations.

Under these circumstances almost any method of making the engine loads more uniform should increase the economy of working. Doubtless an accumulator would benefit any plant in which an engine runs for any considerable portion of the time at less than half of its full power.

If a plant be so small that it contain only one engine, it may be necessary to run it a great deal of the time far below its full load. But even with two engines it is generally possible to select the sizes so that the smaller one runs economically during the periods of light load; the larger one alone is suited to medium loads, and both are used for the maximum output, the times during which any engine is very much underloaded being very short. With a greater number of units it becomes still easier to properly apportion the load, and when there are five or more engines, as is usually the case in large stations, the loss from this cause should be trifling. To be sure the waste of energy which occurs from using boilers for variable loads still remains, but according to the figures given by Mr. Perry this is less than that due to the engines and general experience shows this to be true.

VI—ACCUMULATORS USED AS TRANSFORMERS.

If the cells of a battery are arranged in series while being charged, and in parallel for discharging, a high voltage current will be required for charging and a low voltage current will be given out. The total amount of energy measured in watts is the same minus the loss of 15 or 20 per cent which always occurs in accumulators. The result is similar to that obtained by an alternating current transformer or motor dynamo. Such a method of transformation of potential might be employed in connection with long distance transmission of energy, the current being sent over the line at high voltage and converted to low voltage by accumulators for local distribution. For potentials of several thousand volts, which are commonly employed in transmitting long distances, the number of cells required would be so great as to make this of doubtful practicability compared with the ordinary stationary or rotary transformers, but it would give uniformity in load and other advantages which may be secured by the storage of energy.

VII—ACCUMULATORS USED FOR SUBDIVIDING VOLTAGE.

This application is similar in principle to the preceeding. The most important practical case is that in which a dynamo of 220 volts charges a battery of corresponding potential, a three-wire system being supplied from the battery, the neutral wire of which is connected to the middle point of the battery. This arrangement avoids the necessity of running two dynamos and allows the battery to be placed in a sub-station near the districts to be supplied, so that it is only necessary to run two conductors to that point instead of three. The same principle may be applied to the five-wire system.

VIII—ACCUMULATOR SUB-STATIONS.

The plan of installing battery plants at local centers which are charged from the main station, enables some of the conductors to be saved in a three or five-wire system,

1. See Report of Committee on Data to National Electric Light Association, *Electrical World*, March 2, 1895, p. 273.

as already stated. It also makes it possible to reduce the size of these conductors because the current which flows over them can be kept practically constant, so that it is not necessary to have them large enough to carry the maximum current consumed by the lamps which may be several times the average value. This, of course, gives the same steady load on the generating machinery as if the battery were located near it.

The batteries at the various substations may be connected and charged in series or in parallel. The former plan is similar to case 6, and would require far less copper in the conductors, since the voltage is multiplied by the number of batteries in series, and the current is the same as for a single battery. On the other hand, this high difference of potential would exist between the first and the last batteries of the series, and if either of them became grounded, any person connected to the earth and touching a wire supplied by the other battery would receive a shock due to the total voltage. This would demand that the maximum difference of potential should not exceed 500 volts, or, in other words, four batteries of 110 to 125 volts each might be charged in series and could be connected to the lamp circuits at the same time. This would practically amount to a five-wire system using accumulators to sub-divide the potential as explained in case 7. If the batteries were entirely disconnected from the lamp circuits while being charged, the latter would be free from danger of the high pressure, which might, therefore, be 1,000 or 2,000 volts if desired, the batteries being charged during the day and supplying the lamps at night. For continuous working two batteries would be necessary. Accumulator substations not only save copper in the feeders, but also reduce the cost of, and lost voltage in the distributing conductors because the batteries can be placed near the lamps to be supplied with current.

ACCUMULATORS USED FOR TWO OR MORE OF THE ABOVE-NAMED PURPOSES.

Each of the different uses of the storage battery has been considered separately to avoid the confusion with which this subject is often beset, but as a matter of fact the employment of the accumulator for several of these purposes is the most common practice. By thus combining these different applications the plant may be rendered not only more economical but also much more flexible. For example, the battery may be utilized to help out the generating machinery at times of heavy load or when the latter is partially or wholly disabled. It often happens that it is difficult to produce or maintain sufficient steam pressure owing to poor draught or other circumstances, in which event a battery enables the boilers to be temporarily relieved of some or all of the drain upon them while the pressure is being raised to the proper point. It may also be necessary or desirable to shut down the machinery or a portion of it for a few minutes to make some repair, adjustment or change of arrangement, connection, etc.

It is also possible to feed some of the circuits from the battery, while the others may be supplied at a higher or lower voltage by the machinery. In these and many other ways an accumulator may be a very convenient adjunct to an electric lighting system. The fact that it is so radically different from the machinery in its nature and action makes it very unlikely that the entire plant will be crippled at any one time, since the two sources of current are not exposed to the same dangers. An accident to the steam piping, for instance, might shut down all of the machinery, but it probably would not affect the battery, and *vice versa*, an accident to the latter is not likely to extend to the former.

(To be continued.)

ELECTRIC RAILWAY NOTES.

The Prohibition Park electric road on Staten Island has passed into the hands of a receiver, who has leased it to the Midland Railroad.

The Illinois Central Railroad Company will, inside of 18 months, change the motive power on its suburban service from locomotives to electricity. —*Chicago Times-Herald.*

The elevated and surface railways of New York city carried last year 450,000,000 passengers as against 435,000,000 the previous year; the Broadway cable line carried 140,000,000 passengers and gave 30,000,000 transfers.

The Syndic has stopped the operation of electric railways in Genoa, Italy, on account of frequent accidents. The street grades of Genoa are very steep, and the people of the town were so much alarmed at the possible consequences of a runaway car that they threatened violence.

By a deal recently consummated the properties of the Akron, Ohio, Street Railway Company and the Akron General Electric Company become the property of a New York syndicate, of which General Sam Thomas, Senator Calvin S. Brice's partner, is the head. The consideration was over $1,200,000.

The stockholders of the Eighth Avenue Railroad Company, of New York city, will meet on December 27 to vote upon the lease of the property and franchises of the company to the Metropolitan Street Railway Company. The lease is for 99 years at an annual rental of $215,000 in gold or its equivalent and taxes.

The Rapid Transit Company, of Xenia, Ohio, has contracted with the George H. Mellen Company, of New York, to build an electric road between Xenia and Springfield, 22 miles, work to be begun on February 1, the company to furnish everything and turn over the road ready for operation by the middle of next Summer.

A proposed new trolley fender ordinance has been forwarded to the Brooklyn, N. Y., aldermen by Mayor Schieren, the old one having failed in the test case submitted to the courts. The new ordinance provides for a fender five feet in width and eight inches above the rails, and fixes the penalty for each violation at $100. The ordinance was submitted to the railroad committee.

The Consolidated Traction Company of New Jersey has purchased valuable wharf property at Elizabethport to be used as a terminal of the New Jersey system of the trolley lines in that section of the State, and will connect by means of a ferry across Staten Island Sound with the trolley road on Staten Island. The latter system comprises about 25 miles of road along the shore to St. George and to South Beach.

The Detroit Citizens' Street Railway Company recently put straight five-cent fares into effect, excepting only workingmen's tickets night and morning. This action was in pursuance of a threat made by President Johnson to Mayor Pingree to the effect that if the city government persisted in refusing to meet the company part way in the matter of extending the company's franchises, both the universal transfer system and the six-for-a-quarter tickets would be abolished. The threat has been made good in both respects.

Dr. Albert Shaw, editor of the American edition of the *Review of Reviews*, recently appeared before the assembly committee which is inquiring into the street railways of New York city and other places in the State. He said that he had made a study of municipal government, and had given special attention to street railways, having studied them in England, Scotland, Germany and Austria. When asked what he thought of a system of municipal control of New York city street railways Dr. Shaw said: "I have never for a moment considered such a system. It strikes me as thoroughly unfeasible."

The electric railroad at Lausanne in Switzerland is operated from a central power house in which the dynamos are driven by two gas engines of 130 horse-power each, says an exchange. These engines were built by Crossley Brothers in Manchester, England, and use a gas of somewhat poor quality, which is made in gas producers in the power house. The dynamos are run by belt from the flywheels of the engine. The working is said to be very economical, and the best result obtained has been an expenditure of 550 grams of anthracite coal per horse-power hour in ordinary service. The engines are run on an average 18 to 20 hours per day. A careful calculation has shown that the amount of fuel used is 1,300 grams of anthracite per car-kilometer.

Glucinum.

Glucinum or beryllium, the metal found in beryl, is ceasing to be a chemical rarity, and promises to come into practical use before long. It belongs to the group of the native earths and its native compounds are rare. It is said to be lighter and stronger than aluminum and recent reports state that its electrical conductivity is as high as that of silver. Glucinum is worth at the present time about $18 a pound. It is reported that M. Lebeau has recently obtained pure glucinum from the emerald by heating the emerald in the electric furnace until the silicon is volatilized, when the residue is confined with hydrofluoric acid, and, after a series of purifications, gives glucinum.

MUNICIPAL TELEPHONY.

ABSTRACT OF A PAPER READ BEFORE THE NORTHERN (BRITISH) SOCIETY OF ELECTRICAL ENGINEERS, NOVEMBER 11, 1895, BY A. R. BENNETT.

(Continued from page 325.)

The insulators used for supporting the wires are made at Porsgruna in Norway, and cost 2*d.* each without the bolt. They are of a double-shed pattern. On some of the more crowded routes the subscribers' wires are led in suspended cables. Two of these cables contain 50 wires each, and are of the Pattinson type, that is to say, the wires are insulated with desiccated cotton saturated in paraffine wax, and protected by a heavy leaden tube. Others contain 25 wires and are insulated with india-rubber protected by lead in the same way. These last cables were supplied by Felten & Guilleaume.

The working staff consists of five linemen, who work from 7 A. M. till 6 P. M., with one hour off for dinner. Their pay is £43 6*s.* 8*d.* per annum with an extra allowance of £6 13*s.* 3*d.* to the oldest man, who acts as foreman. The Town Council insures each man for £111 against death, and also for allowances in case of accident or sickness, the premium paid being 9*s.* 11¼*d.* for each £55 of wages. Although the pay of these men may appear low, it is extremely doubtful whether that of the telephone linemen in any town of equal size—30,000 inhabitants—in the United Kingdom averages so much. The operating staff consists of young ladies, eight of whom, with the superintendent, are on duty at one time. At present their duties average a little less than nine and a half hours per week day, but, as this is considered too long, three new operators are about to be appointed. Their pay at present varies from £2 4*s.* 5*d.* to £2 15*s.* 5½*d.* per month, but the scale of wages sanctioned by the Town Council provides for an ultimate increase to £3 6*s.* 7½*d.* per month. The pay of the lady superintendent is at present £40 per annum. In addition, there is a staff of reserve operators, consisting of young girls who have learned the business, but who, pending vacancies on the permanent staff, are only called in on emergencies. They receive a small retaining fee, and are paid for work actually done at the rate of £2 4*s.* 5*d.* per month. As each subscriber asks on the average from eight to nine connections per day, the girls have plenty to do during the busy hours. Each girl has 14 days' holiday per annum on full pay, and is insured against sickness. It will be seen that whatever may be thought of the workmen's wages, the lady operators receive considerably more than their English sisters.

It is certainly a strange comment on the talk we have heard of the greater cost of telephonic work in this country to find that girl operators in Trondhjem are paid better

than those of London, Manchester or Glasgow.

In estimating the cost of working the Trondhjem exchange it is necessary to explain that the Town Council have no way-leave charges to bear. They use the townsmen's roofs by agreement, but in every case at present the proprietor is content with his roof being kept in repair, and exacts no annual payment. Of course it is a serious matter to keep so many roofs in good order, but certainly the Trondhjem Town Council is exceptionally fortunate in escaping money payments in addition.

In another respect the Trondhjem municipality is more fortunate than telephone undertakers in this country. The 10 per cent royalty payable to government on exchange telephone subscriptions has no existence in Norway, not that 10 per cent added to the Trondhjem tariff would make much difference. The average payment would then be £2 19*s.* 9*d.* instead of £2 14*s.* 4*d.* Even a 10 per cent royalty only assumes alarming dimensions when the subscriptions on which it is levied are high.

The switching arrangements at Trondhjem at present consist of eight 100-line boards by Ericsson & Company, Stockholm. There are no special features about them. The ring-off drops are connected in the cords in the usual way. This arrangement is somewhat antiquated and will next year be superseded by a multiple board. A cross-connecting and lightning-guard board is also provided, the lightning-guards being of carbon blocks lying on a carbon plate in connection with the earth, and kept from contact with it by strips of mica. All the work in the exchange has been carried out with excessive neatness, and there is no suggestion of cheapness or neglect about the place.

The second instance of municipal control of telephone systems in Norway is that of Christiana.

In my work on "The Telephone Systems of the Continent of Europe" I give full particulars of the Christiana Telephone Company, which has been a most successful concern. On an inclusive subscription of £4 8*s.* 11*d.* it has for many years past paid a dividend of five and one-half per cent per annum on the capital invested after putting aside large reserve funds, writing off values of buildings and system, and providing benevolent funds for its male and female employés. The accounts given in my books for the years 1893 and 1894 bring out these details very clearly.

At the end of 1894 the company possessed 4,627 exchange lines in Christiana and its immediate suburbs, in addition to being owner of a large system of trunk lines connecting Christiana with the neighboring towns in every direction. At the end of September, 1895, the number of exchange lines had increased to over 5,000.

The management of the company is invested in four directors, who meet every week, and a managing council consisting of 14 shareholders, which meets every month. This council is elected by the general body of shareholders, and it in its turn elects the four directors. The Town Council, which owns a large proportion of the shares, is represented directly on the board of the company by three town councilors, one of whom is a director, and the other two members of the managing council.

The municipality consequently exerts a great influence on the company's policy, which is to provide the best possible communication at the lowest rates commensurate with the payment of a fair dividend to the shareholders. The Town Council's share of the capital is contributed out of the rates, but as a return of five and one-half per cent is obtained on it the ratepayers have no cause for discontent.

The outside construction and the particulars of the subscribers' instruments have been fully described in my book, but the original multiple switchboard has just been replaced by one of largely increased capacity and of the most modern type, which switchboard was brought into use only last month. Although the number of subscribers in Christiana is so great the rate at which new ones join continues undiminished, and it has, therefore, been necessary to provide for a very large additional number.

About two years ago a party in the Norwegian Parliament suggested that the State should take over the whole of the telephone companies, and a committee, consisting of the director of the State Telegraph Department and several other telegraph officials, together with two telephone managers, was appointed to examine the proposal. The committee, which was, of course, an ex-parliamentary one, reported in January, 1894, by a majority in favor of the State acquiring all the telephone exchanges as well as the existing trunk lines. But there was also a minority report which recommended that the State should only acquire the long trunk lines, leaving the local exchanges and the shorter trunk lines, that is to say, those connecting neighboring towns, in the hands of the private companies and municipalities already working them.

When the report of the committee was published, the Norwegian telephone companies and municipalities owning telephone systems formed themselves into a Defense Association and, after holding two meetings in Christiana, at which most of the companies and municipalities were represented, an energetic protest against the report of the committee was presented to Parliament. The contention of the Defense Association was that the State was not in a position to meet local requirements so well as local companies or municipalities could do, and so there would be danger of the great telephone progress, which has hitherto distinguished Norway, being arrested by the formulation of rules not adapted for the wants of particular localities. The Defense Association also considered it probable that the State would not be able to manage so economically as the various companies do and that an increase of the very moderate existing rates would be found indispensable.

The justice of this view was borne out by a proposal, which had been made by the friends of the State acquisition as soon as the report of the committee had become known, that the telephone subscription in Christiana, which for many years past has been £4 8*s.* 11*d.* and has proved sufficient, as I have already stated, to return five and one-half per cent dividends regularly, should be increased to £5 11*s.* 1*d.*

The Defense Association adopted the minority report and recommended that the local exchanges and the short trunk lines should be left in the hands of their present owners while the State should acquire the longer trunk lines which more nearly approximate to the character of telegraph lines. For two sessions no action was taken on the report of the committee, the number of the advocates of State acquisition being estimated at only about 20 per cent of the members of Parliament, but just before the conclusion of the last session, in July, 1895, the permanent Parliamentary committee, which controls the posts, telegraphs and railways (which permanent committee consists of fifteen members of Parliament) recommended that the government should adopt the minority report of the original committee, and thereupon the Ministry decided that the government should acquire the longer trunk lines, only leaving the local exchanges and shorter trunk lines, as they are at present, in the hands of municipalities and private companies.

Private or municipal enterprise has, therefore, been definitely left in Norway to deal with the telephonic question, and from the energy and technical skill which the Norwegian telephone engineers have exhibited in the past there can be no doubt of the result; and it may be assumed that Norway will continue to develop her telephonic system to an extreme of which most people in this country have no sort of conception.

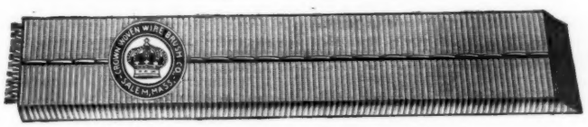
There can be little doubt that State telegraph departments are not the best managers of telephonic facilities. In my paper read before the British Association at their recent Ipswich meeting I gave many statistics and particulars on the progress of telephony in the chief European countries, from which it appeared that the greatest development and the lowest rates, together with the most liberal concessions to the public, are coincident, not with government control, but with private enterprise. This view of the case has, since the meeting at Ipswich, been confirmed independently in a very singular manner.

You have before you two maps, one of Jutland in the Kingdom of Denmark, and the other of the province of Schleswig-Holstein in the Empire of Germany, immediately to the south of Jutland. You will perceive that Jutland is covered by telephone exchanges, there being scarcely a village not possessing one, while trunk lines, shown in red on the map, connect all these together and cover the country with a very network of wires. If you look now at the map of Schleswig-Holstein you will see that there are scarcely more than a half dozen telephone exchanges, while the trunk lines consist of one route running north and south from Flensburg through Kiel to Altona, with a branch to Readsburg.

The Chamber of Commerce of Flensburg, one of the chief towns of Schleswig-Holstein, has recently forwarded copies of these maps to the Imperial Government in Berlin, pointing out to the government what I am now pointing out to you, that in Jutland, where telephonic enterprise is entirely in the hands of private companies, the country is covered with telephonic exchanges and telephonic trunk lines; that subscribers there are never charged more than £4 3*s.* 4*d.* per annum, while in the majority of cases the charges do not exceed from £2 10*s.* to £3 10*s.* per annum. But in Schleswig-Holstein, south of the Danish frontier, the telephone system is in the hands of the Imperial German Post Office, with the result that, although the country is much richer and better populated than Jutland, telephone exchanges are few in number, possess few subscribers and are infinitely worse off than the Danish in respect to trunk line communication, while the annual charges are never less than £7 10*s.* per annum. The Flensburg Chamber of Commerce presents these facts to the Imperial Government, and petition that measures may be taken to improve the development of telephones in Schleswig-Holstein, and especially that the present excessive charges should be reduced, pointing out that the social conditions of Schleswig-Holstein are practically the same as those of Jutland, and if the rates of between £2 10*s.* 0*d.* and £3 10*s.* 0*d.* are remunerative in Jutland, they should be made equally so in Schleswig-Holstein. With the petition was forwarded a list of some of the Danish companies giving particulars of their capital, number of subscribers and dividends, from which it appears that the last range from five per cent to 16 per cent. A more opposite and striking example of the differences between the management of government departments and the results which follow the application of local intelligence, skill and the employment of local capital, it would scarcely be possible to find, for only a few years ago Schleswig-Holstein belonged to the Kingdom of Denmark, and was practically, what it still is geographically, a part of the peninsula of Jutland. Had it remained Danish, Schleswig-Holstein would doubtless be to-day as well telephoned as Jutland is, for private enterprise would not then have been killed by government monopoly.

The German Telegraph Department is a highly organized concern, but it suffers from over-centralization. The headquarters are in Berlin and nothing can be done, however trivial, in any town or village in Schleswig-Holstein or any other part of the vast territory controlled by the department without previous consultation with, and permission obtained from, Berlin. Local conditions are ignored, and the smaller towns and villages can only obtain telephonic facilities by guaranteeing the Post Office, over whose management they have no control, against loss.

(To be concluded.)



THE CROWN "K" WOVEN WIRE BRUSH.

The Crown "K" Woven Wire Brush.

Woven wire brushes are being used very extensively, and one of the largest manufacturers—the Crown Woven Wire Brush Company, of Salem, Mass.—have recently put on the market a new brush called the Crown "K," which is illustrated herewith. This brush is made with a core of very fine braided wires covered with just as fine cloth, but woven after the manner of lace, giving more ventilation than in ordinary weaving. It is then sewed firmly together with a strong thread, which prevents its spreading at the ends, a fault common in many brushes. This brush is very similar to the imported German brush and it is claimed the workmanship is superior. Owing to the duty on the imported brushes, it is said that the Crown "K" can be sold at a lower price. The sales of this company are rapidly increasing. They have recently filled a large order for Mexico.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

Electric Light and Power.

DEFIANCE, OHIO.—The Defiance Light and Power Company has asked permission of the City Council to run their cars by horse-power during the Winter and Spring months.

TRENTON, N. J.—The City Council is considering the project of establishing a municipal electric lighting plant here.

ST. ALBANS, VT.—The St. Albans Electric Light and Power Company's business has increased so of late that they have added to their plant one 40-horse-power generator, two incandescent and one arc machines. The capacity of the plant is now double what it was during the Summer and 135 straight arc lights and 2,000 incandescents can be operated at once.

CONCORD, N. H.—The Gorham Electric Light Company are to extend their lines to Berlin.

DESHLER, OHIO.—Messrs. House & Wheeler have added to their electric light plant a new 2,000-candle-power dynamo, which will furnish 12 or 15 arc lamps for Deshler. The company have stretched over three miles of wire at a cost of $1,000 to $1,500.

SACRAMENTO, CAL.—The Sacramento Electric Power and Light Company has filed articles of incorporation. The capital stock is $1,500,000, subscribed. The directors are Albert Gallatin, of San Francisco, and Andrew J. Ralston, Horatio P. Livermore, Charles Livermore and Joshua Barker, of Oakland.

MONTESANO, WASH. — All arrangements have finally been completed with Albert Daub, of Castle Rock, to put in a system of electric lights in this city.

DETROIT, MICH.—The Fort Wayne Electric Company has just completed a plant for Stanton, and the streets and business houses are now lighted by electricity.

SENECA FALLS, N. Y.—The electric light company has ordered an 80-horse-power engine for its plant.

NORFOLK, VA. — Henry J. Palmer is endeavoring to form a company to erect an electric light plant.

CAMBRIDGE, MASS.—The Board of Aldermen held a special meeting recently and decided to purchase the Cambridge electric light plant.

NEW LEXINGTON, OHIO.—An electric light plant is to be established. Wires for same are now being strung.

CHICAGO, ILL.—The Central Cicero Improvement Association has been organized to secure better light service and water supply. F. R. Lindop, Washington Boulevard, Oak Park, Chicago, is interested.

CLEVELAND, OHIO.—Union Power Company has been incorporated by H. N. Chamberlain, J. Henry White, F. C. Phillips, George C. Wing, Morris S. Towson. Capital stock, $50,000.

JERSEY CITY, N. J.—Power Transmitter Company has been incorporated by Patrick Eagan Bissell, Herbert F. Hatch, East Orange. Capital stock, $1,000,000.

PORTLAND, ME.—Electric Heating Company has been incorporated with John S. Ryder, president; John F. Wood, treasurer. Capital stock, $500,000.

BROOKHAVEN, MISS.—The Brookhaven Improvement Company will erect an electrical plant.

NEW ORLEANS, LA.—Louisiana Electric Light Company, receiver appointed.

HENRIETTA, N. C.—The Henrietta Cotton Mills will establish an electric light plant.

LAKE CITY, FLA.—The Lake City Water and Light Company has obtained 10-year contract to light the city, to be in operation by May 1. It is now in the market for 45 or 50 arc dynamo, wire, lamps, etc.

CHICAGO, ILL.—West Side Board of Commissioners will construct a $65,000 electric light plant in Garfield Park. No contracts yet awarded.

NEW YORK, N. Y.—The New York Gas Improvement Company has been incorporated by Chas. D. Lithgow, Emil Carlebach, John A. Snyder, Edward J. Kavanaugh, Edward D. Phillips and P. F. Vaughn, of New York city, to purchase and develop real and personal property, including machinery, inventions and patent rights relating to the manufacture and production of gas or electricity. Capital stock, $25,000.

OSWEGO, N. Y.—Extensive improvements are being made to the plant of the People's Electric Light and Power Company at Oswego. Several new dynamos have been put in and a new 300-horse-power boiler and engine purchased. The other boilers will be retired.

BELLOW'S FALLS, VT.—A contract for the electric lighting of the streets of this place has been made with the Fall Mountain Paper Company for three years.

PORT JEFFERSON, L. I.—This village is soon to be lighted with electricity by the Port Jefferson Electric Light Company.

STOCKTON, CONN.—The stockholders of the Stockton Gas and Electric Company are seriously contemplating the establishment of a plant for the manufacture of ice in that city.

GREENSBURG, PA.—The freight depot will shortly be fitted up with electric light and telephone connections.

FAIRBURY, NEB. — The Fairbury Electric Light and Power Company has sold its franchise and plant to the waterworks company and the two plants will hereafter be under one management. A new power house will be built. The consideration of the sale is said to be $10,000.

PATCHOGUE, N. Y. — President Jesse C. Mills, of the Patchogue Electric Light Company, is making arrangements with the people of Blue Point and Bellport to put in electric lights in the business places, private residences and on the streets of those villages.

New Electric Railways.

NEW YORK, N. Y.—An eastern syndicate, headed by Gen. Samuel Thomas, of New York, has purchased the street railroad properties in Akron, Ohio, including 25 miles of electric lines. The contract is for $1,200,000.

PORTLAND, ME.—Standard Electric Car and Power Company has been incorporated with John K. Wightman, of Boston, president; George C. Hackett, treasurer; to develop a certain invention of improvement for electrical railways. Capital stock, $500,000.

SAN ANTONIO, TEX.—The Citizens' Electric and Street Railway Company, of San Antonio, has amended its charter by changing its name to San Antonio Edison Company. Incorporators, J. P. Ord, H. E. Barnard and Floyd McGowan. Capital stock, $300,000.

NIAGARA FALLS, N. Y.—The Niagara Falls Street Railway Company has applied for permission to construct its electric railway on a number of streets.

CLEVELAND, OHIO.—The Lorain & Cleveland Electric Railway Company has completed its organization, and elected the following officers: S. H. Short, president; Barney Mahler, vice-president and general manager; J. B. Hoge, secretary, and E. W. Moore, treasurer.

CHICAGO, ILL.—The Chicago City Railway Company is contemplating the extension of its electric road in the downtown districts of the city.

FORT WAYNE, IND.—The Indiana Electric Railway Company, L. D. McNutt, superintendent, has petitioned for permission to extend its road to a point on the St. Joe River, four and one-half miles long.

WILSON, N. Y.—The right of way has been secured for an electric railway, 85 miles long, between Wilson, Pekin and Buffalo. Peter B. Secord, of Wilson, is interested.

MERIDIAN, MISS.—Meridian Street Railway; arrangements are being made to reconstruct same into an electric line. J. L. Handley, president, Meridian; A. W. Hall, Pittsburgh, Tenn., is interested.

XENIA, OHIO.—The rapid transit company has contracted with the George F. Meilen company, 111 Broadway, New York, to build the electric road from Xenia to Springfield; work to commence February 1, 1896.

COLUMBUS, OHIO.—The Columbus & Buckeye Park Electric Street Railway Company's projectors granted an extension of time for building the electric line from Columbus to Hebron.

CLEVELAND, OHIO.—An electric railway will probably be constructed from Cleveland to Akron to compete with the A B C line. The alphabet road was opened a few days ago and certain capitalists are only waiting to see how traffic is before deciding to go ahead and build under the old charter of the Cleveland & Akron road.

TOLEDO, OHIO.—The Toledo Traction Company's new power house is rapidly approaching completion.

AMHERST, MASS.—Steps are being taken to construct an electric road. It is estimated that it would cost $50,000 to build same.

KNIGHTSTOWN, IND.—The Newcastle & Knightstown Electric Railway Company has been organized to build an electric line 17 miles long at an estimated cost of $170,000. T. J. Smith, of Indianapolis, is interested.

MEADVILLE, PA.—The Meadville Street Railway Company has been granted a 35-year franchise for an electric road six and one-half miles long.

NIAGARA FALLS, N. Y.—A new electric road from this place to Buffalo is now talked of.

SPRINGFIELD, MASS.—The directors of the Springfield Street Railroad Company have voted to practically double the efficiency of the Margaret street power station, and expect to expend about $60,000 in the work.

POTTSTOWN, PA.—A charter has been granted by the State Department to the Pottstown and West Chester Electric Railway Company. Capital, $500,000. The president is Joseph P. Robinson, of Philadelphia. The line will be 22¼ miles long, touching at Pughton, West Vincent and Marionville.

New Telephone and Telegraph Companies.

EAST ARLINGTON, VT.—A telephone line is to run between this place and Manchester Center. The poles are up and the wire stretched.

WASHINGTON, ME.—A telephone line will be placed here in the early Spring. The contract has been made.

NEW YORK, N. Y.—The Automatic Telephone Construction Company has been incorporated. Capital $100,000. The principal office is in New York and the directors are: Henry N. Whitney, Silas B. Dutcher, James F. Pierce, of Brooklyn; James W. Hinkley, of Poughkeepsie; George M. Hard, Ernst Thalmann, R. T. Wilson, Jr., William D. Chase, of New York city; John G. Dorrance, of Nyack.

ASHLAND, ME.—The Moosehead Lake Telegraph Company will soon begin the erection of a telegraph line from this place to Oakland, along the line of the new branch of the B. & A.

NEW YORK, N. Y.—The Metropolitan Telephone Company will put up a 10-story office building, Nos. 13 to 17 Dey street.

WELLSBORO, N. Y.—The Tioga, Pa., County Telephone Company has completed the line from this place to Mansfield via Antrim, Morris, Hoytville, Nauvoo, Liberty, Blossburg and Covington.

OXFORD, N. Y.—The local telephone company will extend its line to the Ontario and Western depot.

GRIFFIN, GA.—A new telephone company is being organized by the business men of this place. Each stockholder buys his own telephone from the company, and it is expected to start business with 100 members.

MYSTIC, CONN.—The Southern New England Telephone Company has secured 30 subscribers at this place and will place the instruments in position as soon as the wires can be put up. The price per year has been reduced to $18.

MORTON, N. Y.—Arrangements have been completed for a branch and an extension of the Morton-Troutburg telephone line. The branch will run from this place a mile and a half east to Shay's Corners, and thence north on the Redman road. The extension will run from Morton two miles south to Kendall Mills, bringing the line within six miles of Holley, to which place it will doubtless be extended in the near future.

LAWRENCE, PA.—The extensions of the telephone system soon to be made at this place and Mercer County will result in offices being established at New Wilmington, Clarksville, Middlesex and perhaps at Fredonia.

New Manufacturing Companies.

YOUNGSTOWN, OHIO.—Messrs. James & Barr have opened a new industry here, and will manufacture the wooden parts of telephones. The parts constructed are the back board, battery box and bell box, and they have already booked a large number of contracts

ALBANY, N. Y.—William P. Crary, Lewis F. Betts and Joseph Tripp, of Brooklyn, are the trustees of the Betts Patent Headlight Company, incorporated Tuesday with a capital of $100,000.

DENVER, COLO.—The Salida Electric Company has been incorporated in Chaffee County; main headquarters in Denver. Capital stock, $50,000. Incorporated by Thomas B. Stearns, John W. O'Connor, William F. Bagat, John D. Farrish and Joel W. Stearns.

NEW YORK, N. Y.—The Bergmann Electric Company has been incorporated, to manufacture appliances to produce electricity, gas, steam or heat, and to distribute the same. Capital, $500,000. Directors, Sigmund Bergmann, Harry E. Bailey, Edwin Lavens, Philip H. Klein, Jr., and Frederick La Roche, of New York city.

CHICAGO, ILL.—The Meyer Storage Battery Company has been incorporated. Cap-

ital stock, $50,000. Incorporators, Fritz Meyer, E. W. Adkinson and David M. Ball.

Business Troubles.

TRENTON, N. J.—William L. Dayton has been appointed receiver for the Asbury Park and Belmar Street Railway in proceedings brought in the Federal Court at this place.

HOT SPRINGS, ARK.—James A. Smith has been appointed receiver for the Ouachita Power Company.

BROOKLYN, N. Y.—Jacob Rice has been appointed receiver of the Solar Electric Company which has declared its insolvency.

Increase of Capital Stock.

CHICAGO, ILL.—The Chicago City Railway has decided to increase the capital stock of the company $2,000,000.

PEORIA, ILL.—The Central Railway Company certified to the increase of its capital stock from $600,000 to $750,000.

DETROIT, MICH.—The county clerk has been notified that the capital stock of the Michigan Carbon Works has been increased from $300,000 to $600,000.

"Harnessing" Niagara.

"It is surprising," says *The Scientific Machinist*, "how many people have firmly fixed in their minds the notion that the Niagara cataract has been 'harnessed' and made to do duty like the little waterfall from the mill-race. Standing at a point which commands a good view of Horseshoe Falls, a squad of visitors were recently gazing at the great white sheet through the cloud of mist; among them a representative of this publication. After scrutinizing the Falls thoroughly, both with naked eye and field-glass, one of the group—an Illinois lawyer, prominent in the district he resides in—said, with a puzzled look on his face: 'Where are the wheels? I don't see any.'

"'Of course you can't see them,' said a Massachusetts merchant, with a thoroughly sophisticated air; 'the tunnel is built in the rock behind the cataract and the wheels project into the falling stream some, well, perhaps from two to 10 feet, but not clear through, so that the—what are they called, flukes or floats? are not visible.'

"'And does the water go right on down the river into Lake Ontario?' asked one of the ladies of the party.

"'Certainly,' replied the encyclopedic tradesman.

"'Oh!' exclaimed the lady in surprise, 'I thought it was all used up to make electricity.'"

Medical Batteries.

An announcement in another place in this issue tells about the new line of medical batteries recently placed upon the market by the well-known electrical supply firm of Stanley & Patterson, 32 and 34 Frankfort street, New York city. This line includes the "Diamond," the "Standard," single-deck and double-deck, and the "Eclipse" graduated medical coil. Descriptive matter regarding these devices will be furnished on application.

The Electrical Industry.

[*From the Wall Street Journal.*]

Mr. Charles W. Price, editor of the ELECTRICAL REVIEW, has just returned from a three weeks' trip to the West and of one week in the New England States. He says that there is every indication of the determined effort to stop the manufacture of electrical apparatus at cost or less. He believes that the new year will inaugurate a change in the industry that will put it upon a better paying basis.

Prices in a number of the branches show scarcely any profit and have shown little or none since the panic. This is due, in a measure, to the continuation of operations during the depression, when other industries went out of business or shut down. This continuation was natural, as the panic struck the industry when the boom was on and when various manufacturers had enlarged their plants. It took them some time to realize the state of affairs. Later they were forced to continue or lose their business.

One of the signs of the coming improvement is the depletion of stocks in second and third hands. The minimum amount of repairs have been made and purchases of new apparatus postponed even when it was sorely needed. The demand even now is for immediate delivery and often by telegraph.

A factor that will help the improvement is an increased interest in storage batteries and the utilization of surplus water power.

Electrical Engineers and Insurance Men.

[*From the Insurance Advocate.*]

The *Advocate* has long insisted that in electrical matters underwriters need, and should seek, the advice of competent electrical engineers. In legal affairs the fire insurance man does not proceed without the advice of his lawyer, nor does the life insurance president or manager attempt to select risks for his company without the aid of the trained medical adviser. The handling of electric currents, as they come to be introduced more and more extensively and for multifarious purposes, imperatively demands expert knowledge and special experience. We should not feel safe in employing amateurs and novices to put installations in our houses or business buildings. How much less competent are they to make rules for electrical installations—rules that are to be forced on the community arbitrarily, and that supposedly are to stand as safeguards to the interests of the insurance companies and the public! From an electrical engineering standpoint, insurance men—with very few if any, exceptions, if they have any information at all on the subject of electricity—are no more than amateurs or novices.

Announcement was made on December 5 that a syndicate of Philadelphia capitalists had acquired the entire street railway system and electric lighting plant of Long Island City, N. Y. There are about 60 miles of trolley road in operation and additional mileage will shortly be completed; besides which the system's electric lighting privileges are quite extensive. It is understood that the deal represented a transaction of nearly $2,000,000. A new company will be formed, probably under the caption of the Kings County and Long Island City Traction Company.

WANTED—Position as superintendent of Electric Railway. Thoroughly familiar with electrical equipments, track and trolley construction. Has manager's experience. Address SUPERINTENDENT, care Fremont Wilson, 66 Maiden Lane, New York.

THE BRADY MAST-ARMS.

T. H. BRADY, New Britain, Conn., U. S. A.

Manufacturer of Mast-Arms, Pole and Swinging Hoods, House Brackets and other Specialties for Construction Work.—*Catalogues and Prices furnished on application.*

PROPOSAL FOR ELECTRIC LIGHTING.

Sealed proposals will be received by the Township Clerk of the Township of Bloomfield, N. J., until 7.30 P. M., December 16th, '95, for lighting the streets of said township, or any part thereof, with arc or incandescent electric lights, or both.

Bidders are requested to state the lowest price for seventy-five or more, either 1,200 or 2,000-candle-power arc lights, to be lighted all night and each and every night of the year, and the price of thirty candle-power incandescent lights for same service. Bids also to include the price of mercantile light to private consumers for 800, 1,200 and 2,000-candle-power arc lights, and 16, 30 and 50-candle-power incandescent lights per hour, and for all-night service.

Bidders must also state the system to be used, the locality or proposed locality of power plant, and whether power plant is single or duplicate, and a description of the whole plant.

The Township Committee reserves the right to reject any or all bids.

By order of the Township Committee,
WILLIAM L. JOHNSON,
Township Clerk.

MASON-MAXWELL TELEPHONE MFG. CO.,

MAKERS OF LOCAL AND LONG-DISTANCE

Telephones, Switchboards, Etc.

Send $6.00 for a sample of our House Telephone, with Battery, Receiver and Transmitter, complete, guaranteed to work perfectly on lines up to 500 feet.

Factory and Offices, Richmond, Va.

MESCO DRY BATTERY.

A standard battery for all open circuit or intermittent work. Highly recommended for Telephone Transmitters.

OVER 230,000 SOLD DURING THE PAST YEAR.

For sale by nearly all the Electrical Supply Houses in the United States.

GIVE IT A SEVERE TEST. Unreliable Dry Batteries are not sold much cheaper than the MESCO.

64-PAGE PAMPHLET FREE. Catalogue, 208 pages, 10 cts.

MANHATTAN ELECTRICAL SUPPLY CO.,
32 Cortlandt Street, New York.

FOR SALE.

The plant of the MATHER ELECTRIC CO., located at South Manchester, Conn. This plant has all the modern appliances for doing first-class work, is well equipped and will be sold at a bargain.

Apply to CHAS. M. JARVIS, Receiver, EAST BERLIN, CONN.

WEATHER-PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

AGENCIES:

ELECTRIC APPLIANCE CO., CHICAGO, ILL.

PETTINGELL-ANDREWS CO., BOSTON, MASS.

ELECTRICAL ENGINEERING CO. MINNEAPOLIS, MINN.

ST. LOUIS ELECT'L SUPPLY CO., ST. LOUIS, MO.

BRADFORD BELTING CO., CINCINNATI, O.

PHILLIPS INSULATED WIRE CO.,

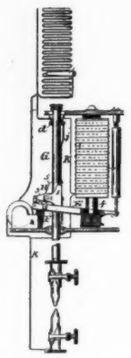
NEW YORK OFFICE: 39 & 41 Cortlandt Street.

FACTORY: PAWTUCKET, R. I.

ELECTRICAL PATENTS

ISSUED DECEMBER 3, 1895.

550,574 Electric arc lamp; T. E. Adams, Cleveland, Ohio.—A clutch comprising a saddle adapted to embrace the carbon rod, a clutch lever eccentrically pivoted to said saddle and a clutch shoe pivoted to said lever.



550,574.—ELECTRIC ARC LAMP.

550,577 Electric switch; C. Bach, Jr., Milwaukee, Wis.—Consists of a spring contact piece formed of a single strip of suitable material, provided with a slit or slot in one end and having the solid portions of said end bent to form parallel spring jaws.

550,638 Electrical protective appliance; A. H. McCulloch, Boston, Mass.—A protective appliance consisting of an easily fusible conductor surrounded by asbestos in a loose and porous state.

550,658 Permutation selector; A. B. Strowger, Chicago, Ill.

550,663 Dynamo-electric machine for plating; W. M. Thomas, Chicago, Ill.—An armature with mechanism whereby current may be furnished for two or three circuits of different constant voltage, a field shunt and series coils arranged in the divided circuits and compounded with the shunt.

550,666 Dynamo-electric machine. 550,703 Commutator; H. P. White, Kalamazoo, Mich.

550,670 Signal circuit; J. V. Young, Boston, Mass.

550,673 Cross-over insulator; F. G. Beron, Waterbury, Conn.—Has an upper and a lower parallel channel for the insertion of wires and a lateral kerf or notch in which the wires are caught.

550,673.—CROSS-OVER INSULATOR.

550,682 Voltmeter; F. Holden, Schenectady, N. Y.—An electrical measuring instrument having as a means of conveying current to the indicating coil flat zig-zag springs.

550,683 Trolley wire crossing; J. C. Kinney, Antonio, Texas.

550,686 Electric cigar lighter; J. F. McLaughlin, Philadelphia, Pa.—Comprises a heating conductor disposed between layers of asbestos with a superposed sheet of wire gauze and suitable circuit connections.

550,688 Electro-therapeutic apparatus; C. Palmleaf, Seattle, Wash.—Consists of an induction coil having a hollow or tubular core, an auxiliary core provided with a series of spirally arranged perforations.

550,692 Armature; H. G. Reist, Schenectady, N. Y.—Consists of a core having notches of two different sizes, a series of main coils in the larger notches, and a second series of smaller or "teaser" coils in the smaller notches, one end of the series being connected to the middle of the series of main coils.

550,723 Device for cooling brake wheels; W. H. Morgan, Alliance, Ohio.—A brake wheel, a brake for controlling said wheel and an air-circulating device actuated by the rotation of said wheel for causing a current of air to act upon the brake surfaces.

550,728 Automatic telephone exchange system. 550,729 Automatic exchange system; J. G. Smith, New York, N. Y.

550,733 Electric safety device; E. Thomson, Lynn, Mass.

550,765 Signaling apparatus for telephone switchboards; C. E. Scribner, Chicago, Ill.—A telephone circuit extending between central and substations, a partially excited signaling instrument in the circuit at the former station and means actuated by the removal of the telephone from its support for the complete excitation and operation of the said signal.

550,775 Speed indicator and alarm; F. Blumenstein, Mount Vernon, N. Y.

550,782 Method of distributing electricity to electric lighting systems; C. M. Davis, Chicago, Ill.—A source of electrical energy of continuous direction, sets of converters and alternators, the several sets being arranged at different phases and in multiple one with the other.

550,812 Holder for electro-plating; E. R. Allen, Wallingford, Conn.

550,822 Self-winding electric clock; C. M. Cook, Chicago, Ill.

550,823 Electric meter; T. Duncan, Fort Wayne, Ind.—An electric meter, a retarding mechanism consisting of an aluminum disk traversing the field or fields produced by one or more permanent magnets having their like poles upon the same side of the disk, and a magnetic shield.

550,841 Electrical measuring instrument; H. C. Parker, Brooklyn, N. Y.

550,857 Electric time alarm attachment; M. Wolff, New York, N. Y.

550,860 Electric cigar-lighting apparatus; W. Biddle, Brooklyn, N. Y.—Composed of the armature and field magnets in a dynamo, a neutralizing electro-magnet and circuit connections, and an armature

550,686.—ELECTRIC CIGAR LIGHTER.

lever and circuit-preserving contacts, and an electro-magnet with its helix in the main line passing through the armature lever for bringing the neutralizing helices into or out of the main circuit.

550,866 Electric furnace; F. Chaplet, Laval, France.

550,868 Automatic electric switch for railways; R. V. Cheatham, Louisville, Ky.

PATENTS.

TRADE MARKS.—DESIGNS.—COPYRIGHTS.

CAN YOU OBTAIN A PATENT?

Send me a model or drawing of your invention, and a description, and I will examine same and advise you promptly. My fees are moderate in all Patent matters, and I can obtain a Patent in the shortest possible time.

All Patents taken out through me are given special notice in the leading journals of the country, thus bringing same widely before the public without cost to inventor.

REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

EDW. S. DUVALL, JR., Solicitor of Patents. Loan and Trust Bldg., WASHINGTON, D. C.

STEAM ENGINEERING

(Stationary, Marine and Locomotive), Electricity, Architectural and Mechanical Drawing, Plumbing, Heating, Mining, English Branches, etc.,

TAUGHT BY MAIL.

Engineers can qualify to obtain licenses. To enroll only necessary to know how to read & write. Circular free. State subject you wish to study.

The International Correspondence Schools, SCRANTON, PA.

PATENTS

ROBT. H. READ,

SUCCESSOR TO

POPE, READ & ROGERS,

41 CORTLANDT ST., NEW YORK CITY.

Electrical Inventions a Specialty.

DYER & DRISCOLL,

Patent Solicitors, 36 Wall Street, N. Y.

have done all my patent soliciting work, both for this and foreign countries, continously for the past fourteen years.

Thomas A. Edison

EXCURSION RATES TO ATLANTA.

On account of the Atlanta Exposition, the B. & O. R. R. Co. will sell excursion tickets at greatly reduced rates. Season tickets will be sold every day until December 15, good returning until January 7, 1896. Twenty-day tickets will be sold every day until December 15, good returning for twenty days from date of sale. Ten-day tickets will be sold Tuesday and Thursday each week until December 24, good returning for ten days from date of sale. The rates from New York will be $37.25 for season, $29.25 for twenty-day, and $24.00 for ten-day tickets.

Correspondingly low rates from other points on the line.

Electrical

AND ALSO

Steam and other Engineering Branches

INSTRUCTIONS BY MAIL.

The Correspondence School of Technology,

New Catalogue. Note Instructors. CLEVELAND, OHIO.

ESTABLISHED 1867

PARTRICK & CARTER CO.

ELECTRICAL SUPPLIES

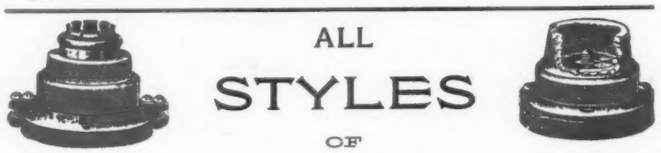
125 South 2d St. Philadelphia

CATALOGUES ON APPLICATION

Send Business Card and Mention ELECTRICAL REVIEW.

ELECTRIC CAR HEATERS.

Railroad Companies desiring to equip their cars with Electric Heaters, by addressing the Hencken Electric Heating Company, 621 Broadway, New York City, will have the fact demonstrated to them that street cars may be heated by the consumption of only three amperes on a 500-volt circuit. We will upon application equip an experimental car at our own expense.



ALL

STYLES

OF

"K. W.'s."

THE BRYANT ELECTRIC CO.

BRIDGEPORT AND CHICAGO.